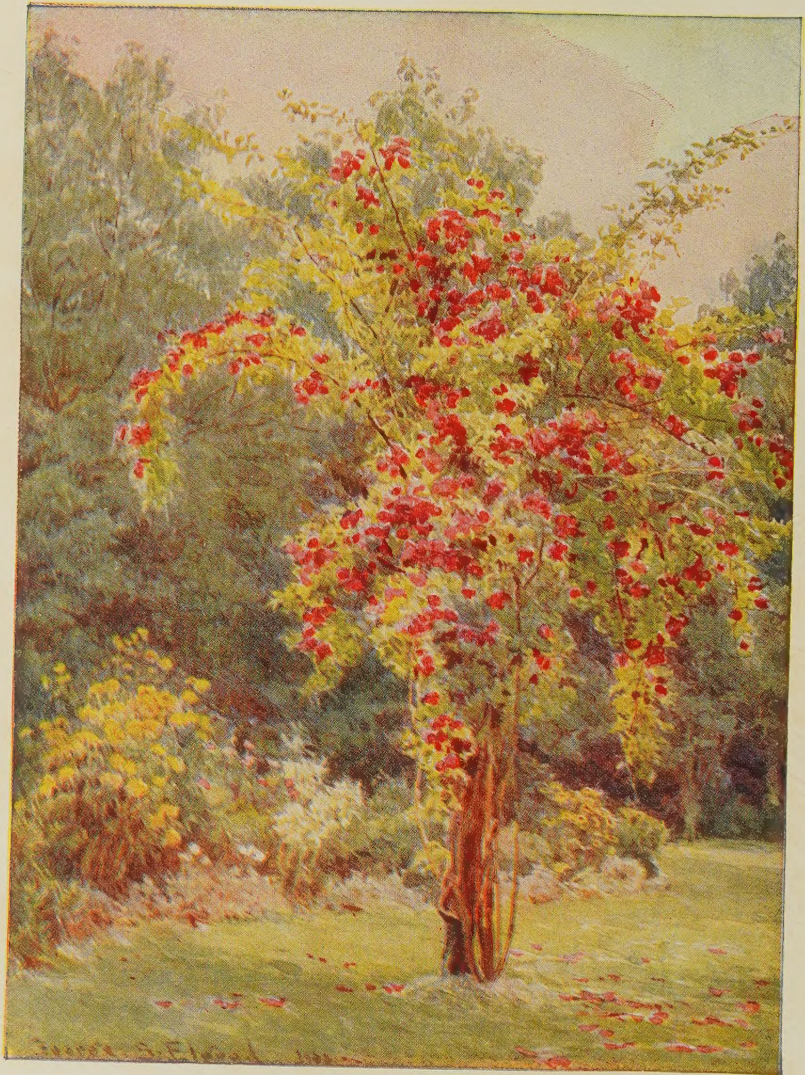
THE GARDEN

FOR EXPERT AND AMATEUR

Digitized by the Internet Archive
in 2024

https://archive.org/details/gardenforexperta0000na



George S. Elgood, R.I.

THE CRIMSON RAMBLER

THE GARDEN

FOR EXPERT AND AMATEUR

EDITED BY

E. T. ELLIS, F.R.H.S.

AUTHOR OF "JOTTINGS OF AN ALLOTMENT GARDENER" ETC.

WITH CONTRIBUTIONS BY THE LEADING
GARDENING EXPERTS AND SPECIALISTS
OF OUR TIME

DAILY EXPRESS PUBLICATIONS

MADE AND PRINTED IN GREAT BRITAIN FOR DAILY EXPRESS PUBLICATIONS BY
MORRISON AND GIBB LTD., LONDON AND EDINBURGH

THIS BOOK IS DEDICATED

TO

ALL WHO HAVE AND LOVE A GARDEN

FOREWORD

Wherever men and women settle and make their homes there you will be sure of finding little pleasances wherein are planted things to satisfy the palate or to please the eye.

Many of these things might be purchased quite cheaply at the corner shop—a pound of apples or a bunch of roses—but the amateur reaps far more golden treasures than are yielded by nature's harvest.

He takes a part in creation; his simple devices give life and form and beauty to things that were not; at his bidding the dead-looking root or dusty grain of seed becomes animate and clothes itself with flowers and foliage and ladens itself with fruit.

There is no black magic about this. It is the Law that as a man sows so shall he reap. As a garden is tended with wisdom and affection so will it respond in usefulness and in beauty.

That is why the veriest amateur who first plants his heart in his garden is bound to make of it an earthly paradise.

There is nothing to fear in starting gardening earnestly; worries and failures begin when earnestness flags. In so far as this can be avoided by careful advice and technical direction this new book will be judged, and it is with this confidence that it is offered to the wide circle of critical gardening readers of the *Daily Express*.

GERALD BUTCHER.

LIST OF ILLUSTRATIONS

COLOUR PLATES

The Crimson Rambler . . . . . . *Frontispiece*
FACING PAGE
Larkspur and Meadow Rue 560
Evening Primrose 820
A Path in a Rose Garden 888

BLACK AND WHITE

Antirrhinum 44
Carnations 158
Daffodils 244
English Bulbous Iris 536
Lilium Aratum Platyphyllum 580
A Rock Garden 862
Sunrise Tomato 1058
Sweet Scented Wallflowers 1148

KEY TO SIGNATURES

Arranged in alphabetical order according to initials.

Signature.	Name of Author.	Articles Contributed.
A. B. T.	TEETGEN, Ada Bessie, Author and Herbal Writer.	Medicinal Herbs, and Potherbs.
A. C. A.	AXTELL, A. C., Supdt., Happy Valley, Llandudno.	Seaside Gardens.
A. D. C.	COTTON, Arthur Disbrowe, F.L.S., Pathologist.	Apple Diseases, Diseases of Plants, etc.
A. G.	GILLIGAN, Albert, D.Sc., B.Sc., F.G.S., Agric. Geol., Leeds.	Soils: Their Origin and Nature.
A. G. J.	JACKMAN, A. G., F.R.H.S. (of Messrs. Geo. Jackman & Son, Nurserymen).	Landscape Gardening.
A. H.	HOPE, Andrew, Nurseryman, Exeter.	Chinese Cabbage.
A. J. B.	BLISS, A. J., F.R.H.S., F.N.G.S.	Gladiolus.
A. W.	WARD A., F.R.H.S., Horticultural Writer.	Bush Fruits.
C. B.	BLAIR, Charles, Head Gardener at Preston House, Linlithgow.	Shrubberies: Management of.
C. C.	COMFORT, Charles, Head Gardener at Broomfield, Davidson's Mains.	Calendar: Greenhouse Work.
C. H. C.	CURTIS, Chas. H., F.R.H.S., late Editor *Gardeners' Magazine*, and Managing Editor *Gardeners' Chronicle.*	Notes on the Chief Annuals.
C. H. H.	HOOPER, Cecil H., F.R.H.S., F.S.I.	Birds and the Garden.
C. H. P.	PAYNE, C. Harman, F.R.H.S.	Historical Notes of Florists' Flowers, also Garden Lore, and Literature of the Garden.
C. N.	NIPPARD, C., Head Gardener at Ashton Court, Bournemouth.	Rhododendron.
C. P. C.	CHATWIN, C. P., F.G.S., late Librarian Geological Society, Geological Lecturer at Liverpool University.	Garden Geology.
C. T.	TURNER, C., Head Gardener at Ampthill Park.	North Borders, Shady Borders, etc.
C. W.	WAKELY, Charles, F.R.H.S., Lecturer at East Anglian Institute of Agriculture.	Increased Production on Allotments.
D. L.	LEWIS, David, Head Gardener Totley Hall, Sheffield.	Calendar: Indoor Fruit and Vegetable Garden.
E.	The EDITOR.	Perennials, etc. etc.

Signature.	Name of Author.	Articles Contributed.
E. A. J.	JEFFERIES, Edward A. (of Messrs. J. Jefferies & Son Ltd., Nurserymen, Seedsmen, and Florists).	Flowering Shrubs.
E. B.	BECKETT, Ernest, Head Gardener at Fota Island.	Nectarines and Peaches: Outdoor Culture.
E. C.	CLARKE, Eileen, Boroughbridge.	Fruit Bottling and Preserving, etc.
E. H. H.	HOWARD, E. H., F.R.H.S. (of Messrs. Barron & Sons Ltd., Nurserymen).	Lilies.
E. K.	KNOWLDIN, Edward, F.R.H.S., Sec. Royal Hort. Soc. of Ireland.	Colour Gardening: Single-Colour Beds.
E. M.	MOLYNEUX, E., V.M.H., F.R.H.S., Steward at Swanmore Park.	Garden Fences, Transplanting, etc.
E. M. B.	BEAR, Ernest M., late Assistant Editor *Farm and Garden*.	Fruit Trees: Spraying.
E. T. E.	The EDITOR.	Ammonia and Ammonium Compounds, Lime Compounds, Potash and Potassium Compounds, Soda and Sodium Compounds, etc.
E. W.	WHITE, Edward, F.R.H.S. (of Messrs. Milner, Son & White Ltd., Garden Architects).	Garden Design on Modern Lines.
Ed. B.	BECKETT, Edwin, V.M.H., F.R.H.S., Head Gardener at Aldenham House; Author and Exhibitor.	Exhibition Vegetables; Vegetables: Blanching and Forcing; and Vegetables under Glass.
F. C.	CAVERS, Doctor Frank, Hon. F.R.H.S., D.Sc., F.L.S., late of Goldsmiths' College.	Plant Physiology.
F. G. W.	WATERER, F. G., F.R.H.S. (of Messrs. John Waterer, Son & Crisp Ltd., Nurserymen.)	American Plants.
F. J.	JORDAN, F., Head Gardener at Ford Manor.	Articles on Indoor Cultivation of Fruit.
F. J. B.	BAKER, F. J., A.R.C.S., Hon. F.R.H.S., Horticultural Reviewer and Critic.	Education and Gardening.
F. R. C.	CASTLE, Frank R., Head Gardener at Brumcombe, Foxcombe Hill.	Articles on Vegetables, Salad Plants, etc., also Calendar of the Vegetable Garden.
F. S.	SMITH, Frank, Editor of *Allotments and Gardens*.	Allotment Organisations: Their Value.
F. T.	TOWNEND, F., late Head Gardener at Brentwood Hall.	Potting, and Potting Shed.
F. V. T.	THEOBALD, Prof. Fred. V., M.A., F.E.S., Hon. F.R.H.S., Prof. of Agricultural Zoology at London University.	Insect Pests, and Insect Pests: General Methods of Destruction.
F. W. B.	BURGESS, Fred W., F.I.J., Journalist and late Editor.	Arbours and Arches, Garden Gates, Trellis Work, etc.

Signature.	Name of Author.	Articles Contributed.
F. W. M. .	Miles, F. W., F.R.H.S., late Head Gardener at Ware Park and Hort. Instructor at Y.M.C.A. Training Centres; Editor *Y.M.C.A. Farm and Garden Bulletin.*	Colour Gardening: Colour Schemes.
G. B. . .	Bunyard, the late George, V.M.H., F.R.H.S. (of Messrs. G. Bunyard & Son Ltd., Fruit Growers).	Apples; Fruit Culture, Hardy: General Considerations; Fruit Rooms and Fruit Houses; Pear; Plum, etc. etc.
G. H. . .	Henslow, Rev. Prof. George, M.A., F.G.S., F.L.S., Hon. F.R.H.S., V.M.H., Author and Botanist.	Botany for Gardeners.
G. H. C. .	Carpenter, Prof. G. H., B.Sc., Hon. F.R.H.S., Royal College of Science, Dublin.	Insect Friends.
G. J. . .	Jekyll, Gertrude, V.M.H., F.R.H.S., Author; formerly Joint Editor of *The Garden.*	Garden Design on Old-Fashioned Lines, Old-Fashioned Flowers, Garden Planning, Potpourri, Water Garden, etc. etc.
G. P. B. .	Berry, George P., F.R.H.S., Chief Technical Adviser, Controller of Hort. Food Prod. Department.	Seed Saving.
G. R. . .	Redman, George, Nurseryman, Clapham.	Moraine Gardening.
G. W. . .	Wilson, Gurney, F.L.S., F.R.H.S., Editor *Orchid World.*	Orchids.
H. A. . .	Allinson, Harry, Supdt., Jephson Gardens, Leamington Spa.	Bedding Schemes for Summer and Winter.
H. A. S. .	Smith, Henry A., F.R.H.S., Assistant Editor *Amateur Gardening.*	Watering.
H. C. . .	Colt, Helen, F.R.H.S., Gardener, London.	Women Gardeners.
H. C. D. .	Davidson, H. C., F.R.H.S., Gardening Editor *Daily News and Leader.*	Garden Paths.
H. D. R .	Rawnsley, the late Rev. Canon Hardwicke Drummond, Author and Poet.	Garden Poetry.
H. E. P. H. . .	Hodsall, H. E. P. (of Messrs. Renny, Forbes & Co. Ltd.)	Green Manuring.
H. G. . .	Geary, H., Author and Bee Expert.	Bees in the Garden.
H. H. A. .	Aitken, Hugh H., M.A., Glasgow, Horticultural Writer.,	Rotation of Crops and Double Cropping, etc.
H. S. . .	Stredwick, Harry, F.R.H.S. (of Messrs. J. Stredwick & Son, Nurserymen).	Dahlia.
H. W. C. W. . .	Wright, H. W. Canning, Croydon, Horticultural Writer.	Cacti.

Signature.	Name of Author.	Articles Contributed.
Ht. C.	Cowley, Herbert, F.R.H.S., Editor *The Garden.*	Soil Improvement.
I. L. R.	Richmond, Mrs, Horticultural Writer.	Annuals, Half-Hardy: List of; Flowers for Indoor Decoration, etc.
J. A. M.	Murray, J. Alan, Reading University College.	Manures.
J. C.	Cameron, Joan, Head Gardener at Glencoe House.	Fumigating.
J. C. A.	Auty, John C., Solicitor.	Gardening Law.
J. C. N.	Newsham, John Clark, F.L.S., F.R.H.S., Principal Monmouthshire Agricultural Institution.	Propagation of Plants.
J. F.	Fraser, John, F.L.S., F.R.H.S., Joint Editor *Johnson's Gardening Dictionary*, etc.; late Editor *Gardening World.*	Biennials, Pruning Fruit Trees, Pruning Roses and Shrubs, Root Pruning, etc.
J. F. W.	Williamson, J. F., F.R.H.S., Seed Potato Grower.	Saving Seed Potatoes.
J. G.	Gardner, the late James, Head Gardener at Batsford Park.	Carnation: The Malmaison, and Carnation: Perpetual Flowering.
J. G. W.	Weston, J. G., F.R.H.S., Head Gardener, Eastwell Park.	Calendar: Hardy Fruit Garden.
J. H.	Halsham, John, Author.	Soil Cultivation.
J. H. C.	Crabtree John H., Botanical and Horticultural Author.	Fungi: Edible and Harmful.
J. J.	Jacob, Rev. Joseph, M.A., F.R.H.S., Secretary Midland Daffodil Society.	Chief Bulbs (with the Editor).
J. J. K.	Kettle, John J., F.R.H.S., Violet Grower.	Violets.
J. K. R.	Ramsbottam, J. K., Special Research Student Royal Hort. Society, late Assistant Editor *Gardeners' Magazine.*	Feeding Plants.
J. L. G.	Gibson, J. Livingstone, F.R.H.S., Horticultural Writer.	Florists' Flowers.
J. McD.	MacDonald, James, F.R.H.S., Lawn Specialist.	Lawns and their Management.
J. P.	Pimlott, J., late Secretary High Wincobank Corporation Allotment Gardeners' Assoc.	Tenure: Security of.
J. T. B.	Barker, J. T., Head Gardener at The West Hill, Hessle.	Orchid House: Management of.
J. W.	Weathers, John, N.R.S., F.R.H.S., Editor *Commercial Gardening*; Director of School of Market Gardening, Isleworth, etc.	Market Gardening.
J. W. B.	Besant, J. W., Editor of *Irish Gardening.*	Irish Gardening, etc.

Signature.	Name of Author.	Articles Contributed.
J. W. H.	Hurst, J. W., Editor of *Nelson's Encyclopædia of Agriculture* and formerly Editor of *Food*.	Food Gardening : Need of.
J. W. M.	Miles, J. W., F.R.H.S., Head Gardener at Welbeck Abbey.	Pleasure Grounds : Making and Management of.
Jas. C.	Clayton, James, Hort. Writer, Chrysanthemum Specialist.	Chrysanthemums.
Jno. H.	Haworth, John, F.I.C., F.C.S., Director of Sewage Works.	Sewage as Manure.
Jno. Ha.	Harkness, John, F.R.H.S. (of Messrs. Harkness & Son, Nurserymen).	Perennials for all Purposes.
Jno. Hl.	Heal, John, V.M.H. (late of Veitch's Royal Exotic Nursery).	Chief Greenhouse Plants.
L. B.-W.	Bigg-Wither, L., Apiary Writer.	Bee Plants : Lists of.
L. J. S.	Spencer, Leonard J., M.A., F.G.S., F.R.H.S., Editor *Mineralogical Magazine*.	Rockwork.
M. A.	Agar, Madeline, F.R.H.S., Holly Bush Nursery ; Authoress.	Garden Plans.
M. G.	Grieve, Mrs, F.R.H.S., Princ. of Whin's Vegetable Drug Plant Farm and School of Medicinal Herb Growing.	Herb Gardening.
M. H.	Hampden, Mary, Horticultural Authoress.	Water Garden : Plants for the.
M. H. F. S.	Sutton, Martin H. F., F.R.H.S. (of Messrs. Sutton & Sons, Royal Seedsmen).	Seed Testing.
P. A.	Aquatias, Paul, Timperley Nurseries.	French Gardening.
P. H. F.	Foulkes, P. Hedworth, B.Sc., Principal Harper-Adams Agricultural College.	Artificial Fertilisers : Their Use in the Garden.
P. S. H.	Hayward, P. S., Hort. Writer.	Edging : Hardy Plants for.
R. A. R.	Rolfe, Robert Allan, Hon. F. R. H. S., A.L.S., Editor *Orchid Review*, Assistant Royal Botanic Gardens, Kew.	Orchids : Potting and Watering of.
R. W.	Wellington, Captain R., Fruit Section, Hort. Div. Food Prod. Dept., Board of Agriculture.	Fruit Grading and Packing, etc
S. A.	Arnott, S., F.R.H.S., Author and Gardening Consultant.	Dianthus, Pyrethrum, Saxifraga, Sedum, Sempervivum etc.
S. & S.	Sutton & Sons, Royal Seedsmen.	Ornamental Grasses.
S. B. L.	Lucas, Stanley Bennett, M.A., Chairman (1919) Assistant Masters' Association.	Arithmetic and Gardening.

Signature.	Name of Author.	Articles Contributed.
S. G.	GRAVESON, S., F.R.H.S. Hort. Author.	Villa Gardening.
S. L. B.	BASTIN, S. Leonard, Hort. Writer and Author.	Italian Gardening, Japanese Gardening, etc.
S. M. K.	KINGSFORD, S. M., F.R.H.S.	Carnation.
S. T. W.	WRIGHT, S. T., Supdt. Royal Hort. Society's Wisley Gardens.	Espalier Mode of Fruit Culture.
T. A. S.	SUMMERFIELD, T. A., Head Gardener at Alderley Park.	Beds: Shape and Character of.
T. B. F.	FIELD, T. B., Head Gardener at Wych Cross Place.	Orchard House: Management of.
T. C. D.	DENNES, T. C.	Training of Plants.
T. H. D.	DIPNALL, T. H., F.R.H.S., Shelley Sweet Pea Farm.	Sweet Peas.
T. R. H.	HAYES, Thomas R., F.R.H.S., Nurseryman.	Heaths (with W. Irving).
T. S.	SMITH, Thomas, F.R.H.S., Head Gardener at Coombe Court.	Wall Gardening.
T. W. S.	SANDERS, Thomas William, F.R.H.S., F.L.S., Editor of *Amateur Gardening*.	Poisonous Plants.
T. W. T.	TAYLOR, T. William, Foreman, Temperate House, Royal Botanic Gardens, Kew.	Olives, and Palms.
W. B.	BORLASE, W., N.D.A., County Organiser of Agriculture to Cornwall Education Committee.	Germination of Seeds.
W. Bt.	BRETT, Walter, Editor *The Smallholder, Smallowner, and Smallfarmer*.	Gardening for the Veriest Amateur.
W. By.	BUSBY, W., Sec. East Suffolk County Association, National Union of Teachers.	School Gardens.
W. C.	CUTHBERTSON, W., J.P., V.M.H., F.R.H.S. (of Dobbie & Co., Royal Seedsmen).	Viola.
W. C. W.	WORSDELL, Wilson Crossfield, F.L.S., Hon. F.R.H.S.	Leaves of Plants: Their Functions.
W. D.	DALLIMORE, W., Horticultural Writer.	Bamboos, and Basket Plants.
W. E. B.	BRENCHLEY, Winifred Elsie, D.Sc., F.L.S., Botanist at Rothamsted Experimental Station.	Weeds.
W. F. M.	MAY, W. F., Editor of *Garden Work for Amateurs*.	Foliage Plants for all Purposes, etc.
W. F. R.	ROWLES, William F., late Head Gardener at Ellisfield Manor.	Garden Frames
W. G.	GIBSON, W., Head Gardener at Levens Hall.	Topiary Work.

Signature.	Name of Author.	Articles Contributed.
W. G. W. .	WILLIAMS, W. Glyn, Lecturer at Bangor University College.	Hybridising and Cross-Breeding.
W. Gd. .	GOOD, William, F.R.H.S., Author and Gardener.	Seed Sowing.
W. Gdn. .	GOODWIN, Dr. William, Principal Midland Agricultural College.	Chemistry for Gardeners, and Manuring : Principles of.
W. H. A. .	AGGETT, W. H., Superintendent Bermondsey Borough Gardens, etc.	Town and City Gardening.
W. H. W. .	WHELENS, W. H., Forestry Author.	Trees : Raising from Seed.
W. I. . .	IRVING, Walter, F.R.H.S., Foreman, Herbaceous Dept., Royal Botanic Gardens, Kew.	Notes on all the chief Rock Plants, also articles on Hardy Orchids, Heaths, etc.
W. J. C. .	CHITTENDEN, W. J., F.R.H.S., Editor of *Garden Life*.	Annuals for all Purposes, Rock Plants for all Purposes, Roses for all Purposes, Garden Tools, Training of Gardeners, etc.
W. J. G. .	GUISE, W. J., Head Gardener at Keele Hall.	Orchards : Making and Management of.
W. L. . .	LOW, the late William, Head Gardener at Euston Hall.	Garden Walls.
W. P. S. .	SEABROOK, W. P., F.R.H.S. (of W. Seabrook & Sons Ltd., Nurserymen).	Cordon Fruit Trees, and Pyramid Fruit Trees.
W. R. . .	ROBINSON, William, F.L.S., Founder of *The Garden* and *Gardening Illustrated*.	Wild Gardening.
W. R. D. .	DYKES, W. Ricketson, F.R.H.S., Secretary Royal Horticultural Society.	Irises.
W. T. . .	TRUELOVE, the late William, Horticultural Writer.	Greenhouse : Management of.
Y. M. C. L. .	YALDING Manufacturing Co. Ltd.	Soap Washes : Their Use in the Garden.

NOTE.—Cross references to other articles are printed in italic caps.; thus, *SHRUBS*.

ABELE (*Populus alba*). — See *TREES*.

ABELIA.—For the best species see *CLIMBING AND TRAILING PLANTS* and *SHRUBS*.

ABIES.—For best species see *TREES*.

ABIETIA.—For best species see *TREES*.

ABRAXAS.—See MAGPIE MOTH in *INSECT PESTS*.

ABSINTHIUM.—Now included in the genus *ARTEMISIA*.

ABUTILON (Nat. Ord. Malvaceæ). These are evergreen shrubs of vigorous growth, branching freely. The branches are thickly covered with buds of bloom, which, when fully expanded, pass from bell-shaped to an almost open form about 3 ins. in diameter. They are of easy culture, thriving in a compost of light turfy loam, peat, and sand, and are invaluable for indoor decoration. They are propagated by cuttings of the young wood inserted in light soil in a close frame in autumn or spring. Temperature needed 40–50° F.

Greenhouse Species and Varieties.—*Abutilon Boule de Neige.*—Fine white. Flowers in August, September, October, and November. Height, 1½–2 ft.

A. Darwinii superbum.—Orange red. Flowers from April to August. Height, 1½–2 ft.

A. Diadem.—Deep purple. Flowers from August to November. Height, 1½–2 ft.

A. Golden Fleece.—Fine bright yellow. Flowers from August to November. Height, 1½–2 ft.

A. Red Gauntlet.—Reddish crimson. Flowers from August to November. Height, 1½–2 ft.

A. rosaeflorum.—Good rose. Flowers from August to September. Height, 1½–2 ft.

A. Thompsonii.—This is a favourite variety with ornamental foliage. Its leaves are green, mottled with yellow and cream-white. Useful for summer bedding. Height, 1–2 ft.—JNO. HL.

UP-TO-DATE SELECTIONS.

Abutilon Early Large-Flowered Hybrids.—Several shades.

A. Prize.—Many lovely colours.

See also *CLIMBING AND TRAILING PLANTS*, and *SHRUBS*.

ACACIA (MIMOSA. Nat. Ord. Leguminosæ). — This is a free flowering greenhouse shrub suitable for spring decorations. The genus includes many distinct shades of yellow, and the species are variable in habit and foliage. Cuttings of half-ripened wood taken at a joint in autumn root freely in sand and peat, if placed under a frame or hand-light with slight bottom heat. Pot firmly in good peat and sand.

Greenhouse Species.—*Acacia armata.*—Yellow. Flowers in May. Height, 1–2 ft.

A. dealbata (SILVER WHATTLE).—The Mimosa of Covent Garden Market, which is produced from seed and most valuable for cutting.

Yellow. Flowers in May. Height, 2–6 ft.

A. diffusa.—Yellow. Flowers in May. Height, 1–2 ft.

A. Drummondii.—Yellow. Flowers in April. Height, 1–2 ft.

A. grandis. — Golden - yellow. Flowers in March. Height, 1–2 ft.

A. longifolia.—Yellow. Flowers in May. Height, 1–2 ft.

A. Riceana.—Yellow. Flowers in May. Height, 1–2 ft.

ACAENA (New Zealand Burr. Nat. Ord. Rosaceæ).—This is a large genus of trailing plants, but we need only trouble with four of the dwarfer sorts which are suitable for the rock garden. These thrive in well-drained sandy soil, in a sunny position, and are propagated by division of the roots in autumn and spring. Seeds will, as a rule, germinate in gentle heat if sown in March.

Acaena adscendens.—This is a dwarf trailing perennial. Flowers purplish. Site open. Soil ordinary. Flowering Period, June to August. Height, about 6 ins.

A. Buchanani.—This is a dwarf trailing plant which is most valuable for carpeting purposes, with bluish-grey pinnate leaves. Flowers insignificant. Site sunny. Soil sandy. Height, 1–2 ins.

A. microphylla.—This is another useful dwarf trailer with bronzy pinnate leaves. Flowers crimson on spiny heads. Site sunny, in rock crevices or joints of paving stones. Soil light, sandy. Flowering Period, June to September. Height, 3 ins.

A. Novae Zelandiae.—This is also a trailing plant with bronzy pinnate leaves. Flowers bronzy on spiny heads. Site sunny. Soil sandy. Flowering Period, June to September. Height, 2 ins.—W. I.

ACAMPTOPAPPUS.—Now included in the genus *Aplopappus.*

ACANTHOLIMON (Prickly Thrift. Nat. Ord. Plumbaginaceæ).—These plants form dense tufts of evergreen spiny foliage. About eight species are in cultivation. All are rock plants, and do best in sunny well-drained positions or on rocky ledges. They are propagated by layering in summer, also by cuttings in July. We describe the four best below:—

Acantholimon acerosum.—Cushion-like tufts of stiff glaucous leaves with sharp points. Flowers rose-coloured in short racemes. Site warm, sunny, rocky crevices. Flowering Period, July. Height, 4 ins.

A. androsaceum.—Tufts of very short spiny glaucous leaves. Flowers crimson-purple. Site warm, sunny. Flowering Period, June to August. Height, 4 ins.

A. glumaceum.—Tufts of green spiny leaves, making large cushions. Flowers bright rose. Site warm. Soil, sandy loam. Flowering Period, June to August. Height, 6 ins.

A. venustum.— Leaves spiny, glaucous, in open rosettes. Flowers rose-pink on long spikes. Site sunny. Soil gritty. Flowering Period, June to August. Height, 6 ins.—W. I.

ACANTHUS (Bear's Breech. Nat. Ord. Acanthaceæ).—In this we have some useful ornamental leaved plants for the herbaceous border. The stove species are of little concern to us. The hardy sorts are not as largely grown as they might be.

Culture.—These plants are not difficult to grow provided an ordinary light soil is afforded, and so long as they are not planted in fully exposed or bitterly cold sites. A south border is probably the best position for them. They may be used in shrub borders or even in a warm wild garden. Planting may be done any time from November to late

March, and division of the roots may be done at the same period. They may also be propagated by seeds sown in the ordinary way in sandy soil.

What to Grow.—Omitting the stove species, we recommend the following for the outdoor garden:—

Acanthus Caroli-Alexandri.—A useful pale rose-pink sort blooming in August. Height about 18 ins.

A. hirsutus.—This is a rose or rose-pink species which appears to be at its best in late July and early August. It grows nearly a yard high.

A. hispanicus (Syn. *A. niger*).—A white species flowering in August and growing about 24 ins. high.

A. mollis.—This is probably the most widely grown and popular sort. It blooms in August and can be had in various colours such as pink, purple-pink, and white. Its average height is a little more than a yard.

A. spinosissimus.—By some regarded as a variety of the species described below, this is a white August blooming sort averaging about a yard high.

A. spinosus.—This sort can be had in white, pink, or purple-pink. It is not as widely grown as *Acanthus mollis.* It blooms in July and August, and averages about a yard in height. *A. s. spinosissimus* is a good variety.—E.

ACARNA.—Now included in the genus ATRACTYLIS.

ACCOUNTS: Garden and Allotment.

A question very often asked, and one which is but seldom easy to answer, is found in "Does your Garden pay?" A definite reply is not often given if the question is put to private gardeners; they will probably say: "Oh yes, I think it pays, but I do not really mind if it does not." If, however, the question is put to a market grower, he answers "Yes" quickly enough, since if his garden did not pay he would soon be bankrupt.

We are much in favour of private gardens being financed much more in the manner of market gardens. In market gardening the keeping of strict accounts is essential to success, and it would be a much more satisfactory arrangement if accounts were strictly kept for private gardens as well. At present very little is done in this direction; in many cases money is no object, it is handed to the gardener for payments, and set down in the householder's account as "Gardening," but no attempt is made at finding out what the gain or return from this money is.

People we have spoken to on this question have said to us: "Why should we trouble? We get the pleasure and the vegetables out of our garden, and whether it pays or not does not matter." We think, however, it matters greatly.

We may say without fear of contradiction that many large gardens of country residences are conducted in a far too extravagant manner. Since there is no reckoning up of profit and loss, there is no way of determining exactly where this extravagance lies. No one can blame the head gardeners of such places. They want to give their master of the best; and until they know that he is reckoning up profit and loss and wants a fair return for the big bills he has to pay, they will continue in their old ways. But the moment he begins to wonder why the bills are so big and enters into the question, his head gardener will find that he can give him just the same for nearly half the cost.

On allotments more care should be taken still in the keeping of accurate detailed accounts. Even the first year, the holder should be able to make his allotment pay,[1] and in subsequent years it will, with care, pay very highly indeed.

Method is everything in the keeping of allotment accounts. The gardener should buy a little account-book and keep the left-hand page for Expenditure, and the right-hand for Receipts. Thus his first page will probably read as follows :—

EXPENDITURE.[2]

Jan.		s.	d.
3.	Tools (spade, fork, and rake)	15	0
5.	Manure (1 load)	6	0
7.	Road sweepings (1 load)	2	0
10.	Lime (2 cwt.)	4	0
15.	Soot (1 bag)	0	6
24.	Manure (1 load)	6	0
		£1 13	6

His receipts will not begin until about June, when he will start pulling his peas and saladings, and lifting his early potatoes. He will not need to sell his produce to find out what his receipts are, but he should ask his wife to inquire on the day he lifts or gets in his crops what the current price is, and enter this in his book.

A page in his receipts in the summer will probably read something like this :—

RECEIPTS.[2]

June		s.	d.
3.	10 heads of lettuce at 1d. each	0	10
16.	1 peck peas	2	6
20.	1 peck broad beans	2	6
25.	20 heads of lettuce at 1d. each	1	8
29.	2 stone early potatoes at 2d. lb.	4	8
30.	Half-peck broad beans	1	3
		13	5

In the autumn, when he is getting up his crops, his receipt section will be very full. For instance, here is a page in October :—

RECEIPTS.[2]

Oct.		£	s.	d.
1.	2 cwt. maincrop potatoes at 5 lb. for 6d.	1	2	5
1.	Onions	0	10	0
8.	4 cabbages	0	0	8
8.	2 cwt. maincrop potatoes	1	2	5
10.	2 cauliflowers	0	0	6
15.	2 cwt. maincrop potatoes	1	2	5
		£3	18	5

These examples will be sufficient to show the method of working. The allotment-holder can find out which is the most paying crop by adapting the above method to his own circumstances; he can also find out which crops do not pay for the cost entailed in producing them, and thus avoid these.—E.

ACER.—For the best species see *TREES.*

ACERATES.—Now included in the genus GOMPHOCARPUS.

ACHILLEA (MILFOIL or YARROW. Nat. Ord. Compositæ).—This genus contains a number of more or less useful herbaceous species, though we must confess there are many better things. The Achilleas are of spreading habit; they spread by numerous underground stems and shoots, so should not be planted near choice plants. They succeed in any good garden soil in a sunny position, and the white flowers of the Ptarmica variety, (known also as the DOUBLE SNEEZEWORT by those who are fond of fantastic English names), form a very striking addition to the forepart of any herbaceous border. They are easily propagated by division of the roots in the autumn or spring, or by root cuttings. They can also be raised from seeds, as mentioned under the Rock Garden Species.

Perennial Border Species.—A few

---

[1] At the beginning of the food crisis in 1917 the writer took a 400 sq. yd. war plot with a view to finding out if it would pay the first year. A careful account was kept, and it was found at the end of the season that there was a clear profit of £2. The writer had not more spare time than other gardeners; indeed, much of his time was taken up in giving requested demonstrations of the best methods of working.

[2] All prices are 50–100 per cent. more at time of going to press owing to abnormal conditions.—EDITOR.

of the many are briefly described below:—

Achillea filipendulina.—A species producing bright yellow flowers from June to September. Height, 4 ft.

A. lingulata buglossis.—A fine form bearing white flowers in June and July. Height, 2 ft.

A. macrophylla.—A species with large leaves and white flowers. It blooms from midsummer to the end of July. Height, 3 ft.

A. Millefolium roseum.—A rose variety of the weed Milfoil, blooming freely in the summer. Height, about 2 ft.; sometimes more.

A. Ptarmica flore pleno.—This is the variety most usually grown. Its masses of double-white flowers produced during the three summer months are good for cutting, or it can be used as a foil for other colours in the herbaceous border. It grows luxuriantly, but needs early staking. *Boule de Neige*, *The Pearl*, and *Perry's White* are specially good forms. Height, about 2 ft.

A. serrata.—A white species flowering from June to August. Height, 1–1½ ft.

A. Tournefortii.—A species bearing bright yellow flowers from June to August. Height, 2 ft.—E. T. E.

Rock Garden Species.—These number about a dozen. All the dwarf sorts are suitable, and thrive in well-drained sandy loam in a sunny position. To propagate, divide the roots in autumn or spring. Most species are also easily increased by seeds sown in gentle heat in March.

Achillea ageratifolia (Syn. *Anthemis Aizoon*).—Leaves in rosettes, silvery, with crimped margins. Flowers pure white, with yellow disc. Site sunny. Soil deep gritty. Flowering Period, June to August. Height, 6 ins.

A. argentea.—A tufted species. Foliage silvery and pinnate. Flowers white. Site sunny. Soil sandy. Flowering Period, July to September. Height, 6 ins.

A. Clavennae.—A neat tufted species. Foliage silvery, leaves lobed. Flowers white in heads. Site sunny. Soil gritty. Flowering Period, June to September. Height, 8 ins.

A. Griesbachii.—Similar to *A. argentea*, but of looser habit, and with larger blooms. Flowers white. Site sunny. Soil sandy. Flowering Period, June to September. Garden hybrid. Height, 8 ins.

A. Huteri.—Similar to *A. umbellata*, but taller. Flowers white. Site sunny. Soil sandy. Flowering Period, June to September. Garden hybrid. Height, 6 ins.

A. moschata.—A sort with sub-shrubby stems. Leaves pinnate, woolly. Flowers white in heads. Site rocky ledge or crevice. Flowering Period, June to August. Height, 6 ins.

A. rupestris.—A neat and tufted species. Foliage green and prostrate. Flowers pure white. Site sunny. Soil gritty, with leaf-soil. Flowering Period, May to August. Height, 4 ins.

A. tomentosa.—Leaves in rosettes green and pinnate. Flowers yellow. Site sunny. Soil sandy. Flowering Period, May to August. Height, 9 ins.

A. umbellata.—A dwarf, tufted species. Foliage silvery, with leaves lobed. Flowers pure white in loose heads. Site, rocky ledge or crevice. Flowering Period, June to September. Height, 4 ins.—W. I.

See also under YARROW in *MEDICINAL HERBS*.

ACHIMENES (Nat. Ord. Gesneraceæ).

These form an important section, their lovely flowers giving a long succession of blooms, and they are most suitable for hanging baskets or pots. When they have finished flowering let them dry off and rest, Repot the dry corms in February, placing several corms in a pot or basket, and give a little gentle heat to start them. Set them in light turfy loam, leaf-mould, and sand. Temperature needed, 45–55° F.

Greenhouse Species and Varieties.—*Achimenes Carl Woolfarth.*—Purplish-crimson. Flowers from June to September. Height, 1–1½ ft.

A. longiflora major.—Large blue. Flowers from June to September. Height, 1–1½ ft.

A. Marguerita.—Pure white. Flowers from June to September. Height, 1–1½ ft.

A. Pink Perfection.—Magenta rose. Flowers from June to September. Height, 1–1½ ft.

A. Scarlet Perfection.—Carmine scarlet. Flowers from June to September. Height, 1–1½ ft.

A. Unique.—Deep crimson, eyes yellow. Flowers from June to September. Height, 1–1½ ft.

ACID MANURES.—See under PHOSPHORUS in *CHEMISTRY FOR GARDENERS.*

ACID SODIUM SULPHATE.—See SODIUM HYDROGEN SULPHATE in *SODA AND SODIUM COMPOUNDS.*

ACIDIA.—See CELERY FLY in *INSECT PESTS.*

ACIDS, BASES, and SALTS.—See *CHEMISTRY FOR GARDENERS.*

ACIDS : Their Uses in Horticulture.

Chemists tell us that there are many hundreds of acids now known, and that the number will increase to an unlimited extent if Chemistry continues to progress at its present rate. Despite the hundreds of acids that are now known, only a fraction of them are any use to the practical gardener, and the notes which follow include the most useful dozen. It may be mentioned that most of the better known organic acids, for instance humic acid, are purposely omitted, since they hardly are covered by the title of the present article.

CARBOLIC ACID is first of the twelve, if we consider them in alphabetical order. In Chemistry it is represented by C_6H_5OH. The chief value of carbolic acid to the gardener is the fact that it can be used very effectually as a soil fumigant. One part of the acid is best mixed with about 100 parts of water; and a gallon of the liquid sprayed on each square yard of vacant land in the early winter. The popular name of Carbolic Acid is PHENOL.

CARBONIC ACID (H_2CO_3) is a very weak acid but extraordinarily useful to the gardener indirectly. The pure acid cannot be obtained, since carbon dioxide (CO_2) is a gas. Spring water often contains it, and water from limestone districts may contain so much of it that lime is dissolved forming bicarbonate, and hence the water is temporarily "hard." It is produced by rotting manure of any kind, and what is known to gardeners as "soil water" is really a very weak solution of carbonic acid. This soil water has a great power over insoluble manures such as phosphates; it also has the power to break down clay and liberate its potash, so carbonic acid must be regarded as very useful to the gardener.

CITRIC ACID ($C_6H_8O_7+H_2O$).—The chief use of this acid to the gardener is to test the availability of phosphates for the food of plants. Many phosphates such as those in bones, coprolites, basic slag, guano, and patent manures, are what is known as "insoluble phosphates," namely, they will not dissolve in water at all. It has been found, however, that in some cases these phosphates will dissolve in quite a large quantity in a weak solution of citric acid, and it has been further found that a 2 per cent. solution of citric acid is equivalent in its dissolving power of phosphates to ordinary soil water, which, as stated above, is really a very weak solution of carbonic acid. This gives us a means of estimating the value of our phosphatic manures, for the more soluble phosphate they contain the greater their value. The gardener prior to buying the manures just named should obtain small samples and test them with 2 per cent. citric acid solution. If after filtering off and weighing the residue he finds that none of it has dissolved, then the material is valueless as a phosphatic fertiliser. If, however, he finds that as much as a fifth or two-fifths (20 or 40 per cent.) has dissolved, the material is of considerable value and should be purchased.

HYDROCHLORIC ACID (HCl) is not much used by the gardener, though to the chemist it is one of the most useful. However, it can be used to test the amount of lime in any soil. To do this a fair sample of the soil (free from stones, roots, etc.) is put into a shallow pot. This is just covered with water, and over this is poured a small quantity of strong hydrochloric acid. If the material starts to fizz or effervesce very briskly and the gas produced extinguishes a lighted taper, then there is plenty of lime in the soil; if practically no effervescence takes place then lime should be added. The actual weight of lime present in any sample of soil can be estimated by using simple apparatus and weighing the acid and liquid before or after mixture. The difference will be the loss of gas given off. To every 44 parts of gas given off (by weight) add 56, and the total is the weight of limestone in the soil you weighed.[1] The popular name of this acid is SPIRITS OF SALTS.

HYDROCYANIC ACID (HCN).—This acid is sometimes used for fumigating, and is made by pouring sulphuric or hydrochloric acid on to cyanide of soda or potash. As, however, the fumes are so very dangerous to human life it is best left severely alone. Even when the greatest care is taken accidents may happen, and seeing there are so many equally good but less dangerous materials for fumigating no excuse can be made for using this one, which is popularly known as PRUSSIC ACID.

HYDROFLUORIC ACID.—This is another very dangerous acid. It is a compound of two gases, hydrogen and fluorine; its chemical symbol is HF. The only use it is from the gardener's point of view is its wonderful power for cleaning dirty glass. There are no stains or dirt marks on glass but what can be fetched off with the greatest ease with this acid. It has a violently solvent action upon glass and almost every form of pottery, so it has to be stored in rubber bottles. Rubber gloves should be put on, also glasses and a mask to protect the eyes and face. The acid should be rubbed over the glass with a square of india-rubber, and as soon as ever the dirt has been removed a quantity of cold water should be washed down it. Do not leave a bottle of it lying about. If you have purchased a little too much, dig a deep hole and bury it.

HYDROFLUOR-SILICIC ACID (H_2SiF_2) is similar to but less active than the above. It can be used for the same purpose.

NITRIC ACID.—This is a powerful and very dangerous compound in its pure state, yet leaf-plants depend on it and its compounds the nitrates more than almost any other compound in existence. Nitric acid is formed in small quantities by flashes of lightning during thunderstorms, and is washed down to the roots of the plants. It can be used in a diluted state for dissolving bones—in a pure state it would char them. Nitric acid oxidises organic compounds in manure and breaks them up into simpler compounds. Its compounds are useful leaf-producing salts, but their application can easily be overdone. This acid is popularly known as AQUA FORTIS.

---

[1] In other words, 44 parts of the gas given off are equivalent to 56 of quicklime.

NITRO-PHOSPHORIC ACID.—Strictly this is not an acid at all, but a mixture of two—nitric and phosphoric—in a dilute state. It is, however, very useful to the gardener. If it is neutralised with carbonate of potash, an almost perfect, and certainly exceedingly powerful plant food is formed. This compound can be used occasionally in the summer as a stimulant at the rate of ¼–½ oz. per gallon of water.

PHOSPHORIC ACID.—The name phosphoric acid may mean one of any six or eight different acids, and the term "phosphate" may be one of a hundred compounds. Thus the gardener has to discriminate between various compounds. Of phosphoric acids *orthophosphoric acid* (H_3PO_4) is the most favoured by the gardener, and of the compounds of this acid, mono-calcium orthophosphate, which is soluble in water, is by far the most useful when it can be obtained. More frequently, however, the only cheap form of phosphoric acid is found in *superphosphate*, a mixture of mono-calcium orthophosphate, calcium sulphate, and tri-calcium orthophosphate—the last two named compounds being insoluble in water. As superphosphate is frequently terribly adulterated, chiefly with cheaper crushed gypsum or more rarely with insoluble phosphate, its soluble phosphates should, prior to purchase, be estimated either in the way described under CITRIC ACID or the way described under SULPHURIC ACID. Phosphoric acid in some form or other is essential to all plant-life, and is especially so in the case of crops grown for their seeds.

SULPHURIC ACID (H_2SO_4).—Oil of vitriol is a familiar liquid to many gardeners. Its uses are many and varied. It is an ingredient of some of the best weed killers, and paths can be cleared of weeds by watering with a diluted solution of this acid once during the early summer. It can be used for dissolving bones, and the method of working is described in the notes on *BONES*, to which the reader is referred. It can also be used for dissolving coprolites, and a material similar to *superphosphate* is produced in both cases. A drop of this acid put into the crown of a dandelion or plantain by means of a skewer will kill the plant. Mixed with fine ashes and crushed pumice, sulphuric acid forms a useful material for cleaning glass, much safer than HYDROFLUORIC ACID. As great heat is produced when water comes in contact with this acid, the gardener should stand quite clear, and right to the windward of the structure when he uses his hose pipe to wash off the acid. It must not come into contact with woodwork, or the wood will be destroyed.

Sulphuric acid can be used for roughly estimating the amount of soluble phosphate a given sample of *superphosphate* can produce. First of all weigh a sample of the superphosphate and put it into a pot of 2 per cent. citric acid. Stir well and filter. Dry the residue and weigh it. Subtract this from the original weight taken and you have the weight dissolved. Now take a simple quantity, say 1 oz. of this residue, and put it into a small weighed glazed porcelain dish. Cover it with strong sulphuric acid and stir with a glass rod. Digest in this way for a day, stirring from time to time, and then pour the contents of the dish very slowly and carefully into a glass beaker containing a quantity of cold water. Now protect your hands and face, and holding the dish away from you pour a little cold water into it to rinse out the remaining contents into the beaker. Stir well and test a drop of the solution in a piece of blotting-paper. If it makes a brown charred mark add more water. Then filter the solution, dry and weigh again (the filter-paper should of course, if large, have been previously weighed).

The residue is insoluble, and from this you can obtain by simple calculations, first the weight of directly soluble phosphates, secondly the weight of indirectly soluble phosphates, and the weight of insoluble matter which remains must be calculated as the waste product. This method is an exceedingly useful one, and if the percentage of "second phosphates," as they are called, is large it might be advisable to treat the material as advised under *Bones* to dissolve it. At any rate the percentage of "first" or directly soluble phosphates should be over 25 per cent., and 35 per cent. to 40 per cent. is much better. If under 25 per cent. the material should be refused.

SULPHUROUS ACID (H_2SO_3).—The last of our dozen acids has limited applications in the gardener's mind. It is produced by burning sulphur in a thoroughly damp atmosphere. It is a very pungent compound with a most searching smell and highly irritating to the eyes, nose, and throat. When a glasshouse has become thoroughly foul with any kind of pest there is usually but one remedy. The plants are removed to the potting shed and drenched with some good insecticide, and then the house is thoroughly damped down with a syringe. Finally a quantity of sulphur is put in an iron plate and a match set to it. A pound of sulphur will be ample for a small house. For further information, precautions to be taken when entering fumigated houses, the reader should refer to the special article on *Fumigating*. The popular name of this acid is Sulphur Dioxide, as it is really a solution of this gas in water.

Before closing this article on Acids it will be well to warn readers that all the strong acids need handling with very great care. Most of the acids just mentioned burn holes in one's garments and one's flesh, producing severe wounds if care be not taken. The more gaseous acids give off fumes which are very harmful and unpleasant. Thus very great care is needed in using them. A golden rule to make when diluting any strong acids is to pour the acid into water, and not the water into the acid. If this is done there is much less danger.—E.

See also *Chemistry for Gardeners*.

ACINETA.—See *Orchids*.

ACIPHYLLA (Spear Grass. Nat. Ord. Umbelliferæ).—This genus is not of any great importance, and only three species are grown at Kew. These succeed in light moist soil, and may be planted in the perennial border, rock garden, or wild garden. Propagation may be effected by seed or division of the roots, and the best time to plant or divide is in late March. The sort most often grown is *A. squarrosa*, the Bayonet Plant, which is a white summer-blooming species growing 2–3 yds. high.

ACIS. — Now included in the genus LEUCOJUM.

ACONITE.—See *MEDICINAL HERBS.*

ACONITI RADIX.—See under ACONITE in *MEDICINAL HERBS.*

ACONITUM (MONKSHOOD. Nat. Ord. Ranunculaceæ).—This is a desirable though intensely poisonous plant, and where there are many children who are allowed to work in the garden, it should be banned altogether, to ensure safety. The whole plant is poisonous, and both seeds and roots are in request by herbalists, as a powerful drug is obtained from them. See article on *MEDICINAL HERBS* for particulars about this. The roots of some may easily be mistaken for those of Chicory, and the tuberous roots of others may be mistaken for those of the Jerusalem Artichoke, hence the plants should be introduced with care. However, they are exceedingly attractive both for use in the perennial border and the shrubbery border, or even in the wild garden, and those who like colour of flower and foliage (the last is a deep and intense green) will not be able to dispense with these plants.

Culture.—The plants can be grown without difficulty by the beginner or experienced gardener alike. They will succeed in sun or shade, though the spikes if required for cutting are best from plants grown in the sun. They may be raised easily by seed sown in the spring or summer in the usual way, though at times it does not germinate very well. They are also easily propagated by division of the roots in November, February, or March. It is advisable, however, to do this work in gloves in case the poison from the roots should get into any cracks in the hands and cause blood poisoning or death. Certainly every piece of crown will grow. Any soil suits them and also any manure. Lifting and division should be done about once in three years, the best time for this work or planting being in the autumn or spring.

What to Grow.—There are numerous species which are splendid. We advise the following :—

Aconitum album.—See *A. variegatum album.*

A. angustifolium.—A form of *A. Napellus*, which see.

A. autumnale.—This species often offered in plant catalogues is really synonymous with *A. Fischeri.*

A. barbatum.—A synonym for *A. Lycoctonum*, which see.

A. bicolor.—See *A. variegatum.*

A. chinense.—This tall Chinese sort is said to be synonymous with *A. Fortunei.* It is a blue summer flowering sort and grows 6 ft. high or more.

A. Fischeri (Syn. *A. columbianum*).—A pale blue late flowering sort coming into bloom from September onwards. Height about 3 ft.

A. Fortunei.—A desirable tall blue flowering sort blooming from late June into October. Height about 6 ft.

A. Halleri.—This is a form of *A. Napellus*, which see.

A. japonicum.—A useful creamy-pink sort blooming from July to September. Height, 4–5 ft.

A. Lycoctonum (Syn. *A. barbatum*).—A yellow-flowering species blooming from late June onwards into early August. Height, 3–4 ft.

A. Napellus.—Probably this is the most popular species of all Aconitums. There are many good sorts and they are being improved year by year. The flowers are dark blue, often of the deepest ultramarine. The flowering period ranges from June to August. The height ranges from 4 ft. upwards. Plants which are well suited as regards position often grow up to 7 ft. or so in height. There are several varieties of this:

A. N. angustifolium is blue and flowers early, while *A. N. Halleri* is blue-purple and also early flowering.

A. variegatum.—This is not a specially good sort, but its blue and white flowers make it worthy of inclusion in fairly representative collections. It is sometimes known to nurserymen by the name of *A. bicolor*. It flowers in the late summer, and ranges from 4 ft. upwards in height. The white variety, *A. v. album*, is also useful.

A. Wilsoni.—A desirable blue sort coming into flower in August and sometimes earlier. It will continue to bloom well into the autumn. It is a tall sort; the writer has seen it 6½ ft. in height.—E.

NEW VARIETY.

Aconitum Napellus album grandiflorum.—This is a charming white-flowered Monkshood, bearing long, pyramidal spikes of bloom and finely divided leaves.

See also *CLIMBING AND TRAILING PLANTS*, and under ACONITE in *MEDICINAL HERBS.*

ACORUS (SWEET FLAG. Nat. Ord. Araceæ).—This is an unimportant genus of hardy herbaceous perennial and aquatic plants of no great value to gardeners. *A. Calamus*, popularly known as SWEET SEDGE or MYRTLE GRASS, is a useful medicinal plant, and is described under the former name in our article *MEDICINAL HERBS*. Another good species is *A. gramineus*. The first grows about 2 ft. in height, while the latter only attains a height of 6 ins. The Sweet Sedge must be carefully distinguished from the other Sedges described in our article on the genus *CAREX*.

See also SWEET FLAG in *WATER GARDEN: PLANTS FOR THE;* also SWEET SEDGE in *MEDICINAL HERBS.*

ACOSMIA.—Now included in the genus *GYPSOPHILA.*

ACROCLINIUM.—Now included in the genus HELIPTERUM.

ACROPHORUS. — Now included in the genus DAVALLIA, for which see *FERNS AND FERN GARDENING.*

ACTAEA (BANEBERRY and HERB CHRISTOPHER. Nat. Ord. Ranunculaceæ).—This is not very often grown, since the berries are distinctly poisonous. It will grow freely with the usual treatment for hardy perennials, in the wild garden, or shady border in the rock garden. Any good garden loam suits it. Plant at the usual time, and increase by division in the autumn or spring. It may also be raised from seeds sown in a frame in the spring.

What to Grow.—The following may be included:—

Actaea alba.—As its name implies, this is a white sort. It blooms in late April and May, and averages about 15 ins. in height.

A. spicata.—This also is white, but bears black berries. It blooms at the same period as the species just described and varies from 1 to 3 ft. in height according to site.

A. spicata nigra.—This is a dark variety of the sort below.

A. spicata rubra.—A red-berried sort bearing white flowers in April and May. Its height varies, but averages about a yard.

ACTINIDIA.—For the best species see *CLIMBING AND TRAILING PLANTS.*

ACTINOMERIS (Nat. Ord. Compositæ). — A little known, and consequently infrequently grown, North American plant with daisy-like flowers. Being an herbaceous perennial and hardy at that, it comes in for the perennial border, the shrub border, or even the more open parts of the wild garden. It is not particular as to soil or site, any fairly kind earth or open site being suitable. Some people mistake it for the Sunflower (*Helianthus*), with which it is more or less closely allied. It is easily propagated by seed sown in the usual way in the spring, or by division of the rootstock in February, and it may be planted any time during the winter and up to the end of March.

What to Grow.—Only one species is at all generally grown, the others may be relegated to botanical collections. This species (*A. squarrosa*) is a yellow flower bearing its blooms from July onwards. Its height averages about a yard.

ADA.—See *Orchids.*

ADAM'S NEEDLE (*Yucca gloriosa*).—See *Yucca.*

ADDER.—See *Snakes.*

ADDERS TONGUES. — See *Dog's Tooth Violets.*

ADENOCARPUS.—For the best species see *Shrubs.*

ADENOPHORA (Nat. Ord. Campanulaceæ).—This genus is one of the several little known and seldom grown hardy herbaceous perennials. The flowers, however, are rather pretty, and the genus is well worth including in large borders where a fair-sized collection is represented. Being of the Campanula order its flowers are not unlike those of the well-known Bellflower, and, in consequence, the prevailing colour is blue.

Culture.—This is not a matter of great difficulty. Any ordinary well-manured soil will suit the plant, so long as a damp, shady, sour silt is avoided. The plant is easily propagated by seeds sown in the usual way, as is described in our article *Perennials, General Culture of.* It may also be increased by division of the roots in the spring, at which time planting is best done.

What to Grow.—The writer is informed by a hardy plant specialist that more than twenty species have been described. A good many are, however, of little consequence and only known to botanists and similar students. The following are recommended :—

Adenophora coronata (Syn. *A. marsupiflora*).—A blue sort coming into bloom in July, and averaging 24 ins. in height.

A. coronopifolia.—This is also blue, but comes in earlier. We have seen it in full flower in June. Its height averages 18–24 ins.

A. denticulata (Syn. *A. tricuspidata*).—This is a blue July blooming sort, averaging 12–18 ins. in height.

A. Fischeri.—This useful blue species coming in during late July and August is closely allied to *A. liliifolia.* It is about 24 ins. in height.

A. intermedia.—Also blue, this sort flowers about the same time as *A. Fischeri*, and is of similar height. It is probably a variety of the above.

A. Lamarckii.—A useful blue early flowering sort coming in during June. Its height averages 18–24 ins.

A. liliifolia.—Probably this is the best known of any. It is a bluish sort flowering during June, July, and August, and its flowers are scented. Its height varies with the variety from 15 ins. to 36 ins.

A. Rabelaisiana.—A blue sort coming in during late July and continuing into August. Height, 18–24 ins.

A. reticulata.—Also blue, this sort, flowering as it does from late June onwards, averages 24 ins. in height.

A. stylosa.—A dwarfer bluish sort flowering in May and June. Its height averages 12–18 ins.

A. verticillata.—A blue sort coming in about midsummer, and averaging 24–30 ins. in height.—E.

ADENOSCILLA.—Now included in the genus *Scilla.*

ADENOSTYLES (Nat. Ord. Compositæ).—This comparatively little known genus used to be united with *Cacalia, C. albifrons,* and *C. alpina,* now being *A. albida* and *A. viridis* respectively. Both are hardy herbaceous perennials of easy culture and thrive in ordinary loam. They may be propagated by seed or division in the usual way, and the most successful time to plant is from November to March. We briefly describe the two species below:—

Adenostyles albida (Syns. *A. albifrons, A. Petasites,* and *Cacalia albifrons*).—A white July blooming plant growing about 2 ft. high.

A. viridis (Syns. *A. alpina, A. glabra,* and *Cacalia alpina*).—A purple July blooming plant growing about half a yard high.

ADIANTUM.—For the best species and varieties see *Ferns and Fern Gardening.*

ADONIS (Nat. Ord. Ranunculaceæ).—A small group of hardy plants, mostly herbaceous, but containing a few annuals. Their bright flowers, produced in early summer, in a setting of elegant foliage render them attractive, while their modest stature makes them suitable for the rock garden.

Annual Species.—The two best are briefly described below:—

Adonis aestivalis (Syn. *A. ambigua*). — This produces crimson-scarlet flowers in May and June, and averages 15 ins. high. Sow in the open in March; or the middle of August.

A. autumnalis.—A British plant known under the popular names of Corn Adonis, Pheasant's Eye, and Red Chamomile. Its flowers are blood-red with dark centre, and open in June, or earlier from autumn-sown plants. The height is 12–18 ins.

Rock Garden Species. — All the four perennial species are suitable for the rock garden. They require a deep loamy soil, and are easily propagated by dividing the roots in autumn or spring. They may also be raised from seeds sown in gentle heat in March, but these take a long time to germinate.

Adonis amurensis.—Leaves in tufts, deeply divided and fern-like. Flowers large golden-yellow, 2 ins. across. Site half-shady or sunny. Soil deep loam. Flowering Period, February to March. Height, 1 ft.

A. pyrenaica.—A tufted plant with fern-like leaves. Flowers bright yellow. Site half-shady. Soil deep loam. Flowering Period, April to June. Height, 1 ft.

A. vernalis.—Like the above in habit, but easier to grow. Leaves fern-like. Flowers large golden-yellow. Site open. Soil deep loam. Flowering Period, March to April. Height, 9 ins.

A. Walziana.—Like the above, but blooms later. Leaves more finely divided. Flowers yellow. Site open. Soil deep loam. Flowering Period, April to May. Height, 1 ft.

ADVANTAGES OF CORDONS. — See *Cordon Fruit Trees.*

ADVICE ON MARKET GARDENING.—See *Market Gardening* and *Women Gardeners.*

ADYSETON.—Now included in the genus *Alyssum.*

AECIDIAL STAGE.—See *Rust Fungi.*

AECIDIOSPORE STAGE.—See *Rust Fungi.*

AEGERIA.—See Currant Clearwing in *Insect Pests.*

AEGILOPS. — Now referred to the genus *Triticum.*

ÆGLE.—For best species see *Shrubs.*

ÆGOPODIUM (Nat. Ord. Umbelliferæ).—This is a genus of strong growing and highly troublesome weeds. The most notable species (*Æ. Podagraria*) is described under Gout-weed in our article on *Weeds.*

ÆGOPOGON (Goats-beard Grass. Nat. Ord. Gramineæ).—This is a genus of hardy grasses, easily grown in the wild garden, but not of much consequence. The best known species is *Æ. geminiflorus* (Syn. *Æ. pusillus*), which grows about 6 ins. high.

ÆRIDES.—See *Orchids.*

ÆSCULUS.—For the best species see *Trees.*

ÆTHIONEMA (Burnt Candytuft. Nat. Ord. Cruciferæ).—Many of the perennial species are suitable for the rock garden. These thrive in well-drained sandy soil in a sunny position, and are propagated by cuttings in July or by seeds in March.

Rock Garden Species.—The best are briefly described below :—

Æthionema amoenum.—Shrubby. Leaves glaucous, entire. Flowers pink in long racemes. Site, sunny ledge. Flowering Period, May to June. Height, 9 ins.

Æ. coridifolium (Syn. *Iberis jucunda*). — The bushy Lebanon Candytuft. Leaves glaucous. Flowers rosy-pink. Site, sunny ledge. Soil gritty. Flowering Period, June to July. Height, 6 ins.

Æ. grandiflorum.—Shrubby. Leaves glaucous. Flowers rosy-pink in long racemes. Site, sunny ledge. Flowering Period, June to July. Height, 1–1½ ft.

Æ. pulchellum.—Shrubby. Leaves very glaucous. Flowers rosy-purple. Site sunny. Soil gritty. Flowering Period, May to June. Height, 6 ins.

ÆTHUSA (Nat. Ord. Umbelliferæ). Only one species of this is grown at Kew, namely, *Æ. Cynapium* (Syns. *Æ. elata* and *Æ. micrantha*), the well-known weed popularly called Fool's Parsley. It is a poisonous plant of no garden value whatever, and is described in our article on *Weeds.*

AFRICAN HEMP.—See *Sparmannia.*

AFRICAN LILY.—See *Agapanthus.*

AFRICAN MARIGOLD.—See *Marigold.*

AFRICAN OIL PALM (*Elaeis guineensis*).—See *Palms.*

AGAPANTHUS (African Lily. Nat. Ord. Liliaceæ).—This is a most useful plant for the greenhouse or conservatory, requiring very little attention, and increased by divisions or seed in spring. The soil should be good loam, with a little decayed leaf-mould and sand. Temperature needed, 40–45° F.

Greenhouse Species and Varieties.—*Agapanthus umbellatus.* — Blue. Flowers in August. Height, 2 ft.

A. u. albiflorus.—White. Flowers in August. Height, 1½–2 ft.

A. u. Mooreanus.—Blue. Flowers in September. Height, 1½–2 ft.

AGARIC. — See bleeding agaric, under Edible Fungi in *Fungi.*

AGARICUS.—See bleeding agaric under Edible Fungi in *Fungi*; See also *Mushroom.*

AGAVE (Nat. Ord. Amaryllidaceæ). This is a group of succulent plants requiring very little attention throughout the year. Large size plants are extremely ornamental during the summer months for the decoration of lawns and terraces; they have a grand effect, and will stand the scorching rays of a summer sun unprotected. They are best propagated by suckers in the spring. Rich, loamy soil, decayed leaves, and brick rubbish is the best soil, and water must at all times be rather sparingly given. Temperature required, 45–55° F.

Greenhouse Species and Varieties :—*Agave americana.*—Yellowish. Flowers in August. Height, 2–6 ft.

A. celsiana.—Green. Flowers in May and June. Height, 2–4 ft.

A. densiflora.—Green. Flowers in September. Height, 2–4 ft.

A. filifera. — Greenish - white.

Flowers from July to August. Height, 2–4 ft.

A. flavescens. — Greenish-white. Flowers from July to August. Height, 2–4 ft.

A. Yuccafolia.—Yellow. Flowers from August to September. Height, 2–6 ft.

AGERATUM. — See *ANNUALS, HALF-HARDY: LIST OF.*

AGLAOMORPHA.—Now included in the genus POLYPODIUM. See *FERNS AND FERN GARDENING.*

AGRIMONIA. — See *AGRIMONY*, and under AGRIMONY in *MEDICINAL HERBS.*

AGRIMONY (*Agrimonia.* Nat. Ord. Rosaceæ).—Those readers who are students of wild flowers, or who read Nature books, or made Nature rambles in their young days, will know this plant. And although Agrimony is a wild flower and not much grown, the four sorts *A. agrimonioides, Eupatoria, odorata,* and *suaveolens* may be included where space can be spared and where plants of this class are favoured. All the four species just named produce yellow flowers in June and July; they average 2 ft. in height, though at times they exceed this.

Culture.—This is easy. The plants grow without difficulty in ordinary good garden soil. Planting may be done any time in the autumn, winter, and spring. They may easily be increased by division of the rootstock in the autumn, or seeds may be sown and the plants grown in the usual way for perennials.

E.

See also *MEDICINAL HERBS.*

AGRIOLIMAX. — See SLUGS AND SNAILS in *INSECT PESTS.*

AGROPYRON (Nat. Ord. Gramineæ). This is a genus of weeds, including many species of *TRITICUM*, which see.

A. caninum (Syn. *T. caninum*) is the DOG'S-TOOTH GRASS, and *A. repens* (Syn. *T. repens*) is the well-known COUCH GRASS or TWITCH described under the former name in our article on *WEEDS.* We might name a host of the other species with their synonyms, but as none are worthy of culture we need not trouble the reader with them.

AGROSTEMMA. — Now included in the genus *LYCHNIS.*

AGROSTIS (Nat. Ord. Gramineæ). This is a genus of grasses which are not of any great garden value. The more ornamental species are described in our article on *ORNAMENTAL GRASSES.* BENT GRASS is a troublesome weed, and is mentioned in our article on *WEEDS.* Some of the dwarfer species are used in lawn mixtures.

AGROTIS.—See under SURFACE LARVÆ in *INSECT PESTS.*

AILANTHUS.— For the best species see *TREES.*

AIRA (HAIR GRASS. Nat. Ord. Gramineæ).—This is a genus of hardy grasses of little garden value thriving in ordinary soil. Probably the best known species is *A. caryophyllea,* the MOUSE GRASS. Most of the species are now classed with other genera.

AJAX.—Now included in the genus *NARCISSUS.*

AKAKASI (*Quercus acuta*). — See *TREES,*

AKEBIA.— For the best species see *CLIMBING AND TRAILING PLANTS.*

ALASKA CYPRESS.—(*Cupressus nootkatensis*).—See *TREES.*

ALBERSIA. — Now included in the genus AMARANTUS.

ALBUCEA. — Now included in the genus ORNITHOGALUM.

ALCEA.—Now included in the genus *ALTHAEA.*

ALCHEMILLA (LADY'S MANTLE. Nat. Ord. Rosaceæ).—This is a genus of hardy perennial and half-hardy greenhouse plants which are chiefly desirable on account of their silvery foliage. We need not trouble with the greenhouse sorts, or with many of the hardy kinds. Two of the latter are, however, suitable for the rock garden; these thrive in well-drained soil in a sunny position, and are propagated by division of the roots in autumn or spring, or by seeds which germinate freely if sown in gentle heat in March.

Alchemilla alpina.—This is a tufted plant which in time will form a carpet. Leaves like those of the strawberry, silvery and evergreen. Flowers inconspicuous and greenish. Site sunny or open. Soil ordinary well-drained. Flowering Period, June to July. Height, 6 ins.

A. pentaphyllea.—This is a tufted plant with long fan-shaped divided leaves. Flowers white. Site open or half-shady. Soil gritty. Flowering Period, July. Height, 6 ins.

See also PARSLEY PIERT in *MEDICINAL HERBS.*

ALDER.—A name applied to the genus ALNUS. See *TREES.*

ALEYRODES.—See CABBAGE WHITE FLY in *INSECT PESTS.*

ALFREDIA. — Now included in the genus *CARDUUS.*

ALKANET. — A name applied to *ANCHUSA*, which see.

ALL-GOOD (*Chenopodium Bonus-Henricus*).—See *CHENOPODIUM.*

ALL SAINTS CHERRY (*Prunus acida semperflorens*).—See *TREES.*

ALLIARIA. — Now included in the genus *SISYMBRIUM.*

ALLIUM (Nat. Ord. Liliaceæ). Many of the species of this genus have their culture fully described under their English names, and readers should turn up our articles on *GARLIC*, *LEEKS*, *ONIONS*, and *SHALLOTS*, and our notes on CHIVES in the article on *SALAD PLANTS.* There are, however, a number of species which have attractive flowers, and these, though bulbs, can be treated as hardy perennials in the border or rock garden. They succeed in light loam in open sunny sites, and may be planted in the autumn or spring. They can readily be increased by sowing seeds in the usual way in spring.

Perennial Border Species.—A few of the large number known are briefly described below, all of which are hardy:—

Allium acuminatum.—A rose or dark purple-red sort flowering about July. Height, 8 ins.

A. amblyophyllum.—A purple July blooming sort about half a yard high.

A. backhousianum.—A white July blooming species about a yard high.

A. caeruleum.—A useful blue June flowering sort rarely exceeding half a yard in height.

A. Fetisowi.—Described by a trusted authority as a "rosy-lilac," this sort flowers during the summer months and averages about half a yard high.

A. giganteum.—Similar in colour to the above and flowering in June, this species may attain a height of a yard or more.

A. hoeltzeri.—A white summer-blooming sort about half a yard high.

A. medium (Syn. *A. triquetrum*).—A pure white June flowering species about 1 ft. high.

A. nigrum.—Syn. *A. pulchrum*, which see.

A. oxypetalum (Syn. *A. olgraceum*).—A white sort flowering in August and September and attaining a height of 1 ft.

A. pulchellum.—A scarlet sort blooming in July. Height, 1 ft.

A. pulchrum (Syn. *A. nigrum*).—A yellow June flowering sort of similar height to the above.

A. Purshii (Syn. *A. vineale*).—A pink August flowering sort about half a yard high.

A. roseum.—A rose or light pink sort blooming in June and July. Height, 12 ins.

A. triquetrum.—Syn. *A. medium*, which see.

A. vineale.—Syn. *A. Purshii*, which see.

A. violaceum.—A sort with violet coloured flowers which blooms in June. It grows about 1 ft. high.

Rock Garden Species.—About six species are useful. They are the dwarfer perennial kinds with attractive flowers. All thrive in an open position in deep loamy soil and are propagated by seeds sown in gentle heat in March.

Allium kansuense.—Leaves in tufts from small bulbs. Flowers blue in pendent heads. Site open. Soil ordinary. Flowering Period, June to July. Height, 6 ins.

A. macranthum.—Leaves tufted, long and narrow. Flowers rosy-pink. Site sunny. Soil deep loam. Flowering Period, June to July. Height, 1 ft.

A. Moly (Lily Leek).—Leaves glaucous. Flowers yellow. Site open. Soil ordinary. Flowering Period, June to July. Height, 1 ft.

A. narcissiflorum.—Habit tufted. Flowers rosy-purple in large pendent heads. Site sunny. Soil deep loamy. Flowering Period, May to June. Height, 9 ins.

A. neapolitanum (Daffodil Garlic).—Flowers white in umbels. Site warm and sunny. Soil deep loamy. Flowering Period, May to June. Height, 1 ft.

A. ostrowskianum.—A handsome species with tufted foliage. Flowers rosy-pink, large. Site sunny. Soil deep loam. Flowering Period, June to July. Height, 6 ins.

A. sikkimense.—Leaves grass-like in tufts. Flowers blue in drooping heads. Site open. Soil ordinary. Flowering Period, June to July. Height, 6 ins.

ALLOSORUS.—Now included in the genera Cryptogramme and Pellæa, for which see *Ferns and Fern Gardening*.

ALLOTMENT ACCOUNTS. — See *Accounts: Garden and Allotment*.

ALLOTMENT GARDENERS' AGREEMENTS.—See *Gardening Law*.

ALLOTMENT ORGANISATIONS: Their Value and Purpose.—In dealing with this subject one is struck with the fact that the allotment movement has, at a bound, taken a recognised place in our national life. Prior to 1914 allotments were familiar landmarks up and down the country, but allotments organised for a national purpose were practically unknown. The present position is a product of the war. But neither allotments nor the organisations which represent them will pass with the war. The great army of amateur land-workers, who, at a time of national crisis, rallied to the country's aid, have earned the gratitude of the nation. It is now the duty of those in authority to see that the men and women who made secure the food supplies of the nation in the hour of peril shall have their heart's desire—a permanent place on the soil of their native land.

Present-day conditions have in some respects changed, or enlarged, our pre-war views as regards the value and purpose of allotments. Prior to August 1914 an allotment was generally looked upon as a means of offering a useful opportunity to the casual employed, or under-employed, worker, to supplement his earnings. The next stage in the development of the allotment idea was the revelation that if we were unable to continue to import our food supplies we must grow them or go without. We wisely decided to grow them, and the allotment was at once accepted as a wartime expedient. We have, however, arrived at a further stage of development. Allotments are now recognised as being an all-time necessity.

The education of public opinion along this line has been as rapid as it is complete. In London, for example, in August 1914 there were some 500 organised plotholders. At the end of 1916 there were 6000. In August

1918 there were over 50,000, and this number was being constantly added to.

Taking the country as a whole, there were, by August 1918, according to the calculations of the Board of Agriculture, upwards of 1,500,000 allotments, with a total produce of as many tons, and the total value of the produce, calculated at the then current rates, was estimated at fifteen millions sterling. We may, therefore, safely come to the conclusion that the allotment has come to stay.

Prior to the Great War, however, there were those who saw in the allotment a valuable national asset, not only in regard to the production of food, but from a health and social point of view. Among them was the late Joseph Fels, who saw that in the land of a nation, rightly used, lay the health, happiness, and prosperity of that nation, and that idle land was a national eyesore and a national crime. He, having demonstrated in Philadelphia the practical value of cultivating waste pieces of land in that city, introduced the idea to London by founding in 1907 the Vacant Land Cultivation Society. The object of this Society was to utilise the vacant sites in our large cities for food-growing purposes. It was uphill work, and at the end of 1914, after seven or eight years' effort, only some 400 plotholders had been enrolled in London, and one or two outposts established in the provinces. The difficulty was not to induce people to cultivate plots but to secure land for cultivation. Even during the two years which followed the outbreak of war, although the demand for allotments increased in volume, land on every hand was lying idle. It required an Order under that drastic measure, the Defence of the Realm Act, to secure possession of land for which the demand was so urgent and the need so plain. The result was immediate and phenomenal. Within a year from the putting into operation of the Cultivation of Lands Orders (1916), the plotholders of the V.L.C.S. alone increased to over 6000, and the value of produce raised in that year from this source from previously derelict land was estimated at over £60,000.

The V.L.C.S. took a leading part in the formation of the National Union of Allotment Holders, which body is now organising allotment societies throughout the country. The objects of the National Union are: To secure land in every district, urban and rural; ensure that it shall be used in the most effective manner and give to the plotholders: (1) Instruction where necessary; (2) assistance in the shape of lectures, demonstrations, shows, etc.; (3) advice as to the purchase of seeds, etc., on the co-operative principle, and practical help in the overcoming of any difficulties. But one of the chief functions of the Union is the banding together of the plotholders in order to facilitate united action for securing such legislation as the future may require.

The method adopted by the National Union in its organising work is the formation of local societies under their own honorary officers and democratically elected committees, the grouping of them into associations or federations, and finally linking them up in divisional sections, which in turn are united under a nationally elected executive. Already several valuable contributions in the shape of books of technical instruction have been issued. A national monthly organ, *Allotments and Gardens*, has been started, which is recognised as being of great value in advising, consolidating, and strengthening the movement.

It required Armageddon to bring home to the British people the extent of their dependence on outside sources for their daily existence. But the allotment movement has demonstrated that, given access to the land, the people of this country can, and will put an end to the danger of food shortage. It has also shown the advantage to be gained by the bringing into close touch and association all classes of the community, thus breaking down class and social barriers, moulding individual characters and uniting all sections of the community, a result which must have a far-reaching effect upon the home life of the nation. —F. S.

[The objects of the National Union may well be taken as the foundation for the rules and objects of any allotment organisation or association, however small it may be. A very large number of these bodies even now exist solely for exhibition purposes, and spend all their funds on having an annual show which is of very little practical use to any one. Practical instruction is often completely neglected. Lectures are, except in the case of "go ahead" associations, considered unprofitable and too risky and doubtful to be taken on. Co-operation in seed and manure buying also is far too seldom found as part of the duties of an allotment society. But if societies would only apply these matters they would not merely be helping their own members, but they would be vastly helping the country by increasing the amount of food produced.—EDITOR.]

ALLOTMENTS : Increased Production on.—See *INCREASED PRODUCTION ON ALLOTMENTS.*

ALLOTMENTS : MANAGEMENT OF. Allotment gardening has become such a universal pursuit that the Dictionary would, we think, be incomplete without an article on Allotment Management, so we give a brief sketch below. We think that the allotment gardener will find the Vegetable Garden Calendar very useful for telling him what to do at each month of the year, adapting it to the special needs of his case.

In the management of an allotment, tools are our first consideration. So often the tools amateurs try to use when starting an allotment are toy tools in the fullest sense of the word. But they should not be toy tools: they should be proper garden implements, made of tempered steel, with light wood handles.

Of the tools necessary, we of course mention first of all the spade, a digging-fork, and a rake. After these, two hoes, a pull hoe and a push hoe, a small potato fork, a water can, a trowel, and a 60-yard garden line will be required. A wheelbarrow is not absolutely essential to complete the outfit, but it will be found very useful.

In addition to tools; manures, seeds, lime, etc., will have to be purchased. Elaborate tables of the needs of amateurs in these directions will be found in any of the many allotment books which are now on the market, and we do not, thus, propose to include such directions here.

Allotments should be started in the winter months. Then one realises to the full the sorrows and labour of this kind of food production. Even so one confesses the following autumn as the crops are taken home that the labour and sorrow have been worth while. As we wheel our produce home we forget how many times we have been wet through, or chilled to the marrow, during the past winter when digging our plot, and a good thing too.

Winter Digging.—When we have our tools the sooner we start digging the better. Our plot will probably be a piece of rough meadow land, and we have first of all to decide how to tackle it best. This rather depends on the nature of the sod. If the sod is teeming with vicious rooted weeds, no good purpose but a very bad purpose would be served by turning it in; if on the allotment the sod is mostly fine springy meadow grass it would be a thousand pities not to turn it in.

Amateur allotment holders wishing to save themselves trouble are very apt to decide to have their plots ploughed up, instead of digging them. No mistake could be greater, and no blunder more disastrous in its effects. The writer has seen plots ploughed up, he has seen the multi-millions of weeds which grow on them, and he has seen the poor worthless crops which struggle against stifling, yet succumb to it. Even when the plots are properly dug many thousands of weeds appear, but these are nothing to the weeds resulting from ploughing. Double-digging is, we consider, the ideal for allotments; it is better than trenching, for in trenching the foul material—sour subsoil—is brought up to the top and the good soil buried. Double-digging is described in the article on

Soil Cultivation, to which readers are referred for full particulars. In double-digging meadow land the sod is buried at the bottom of the first spit. The clod, of sod and soil, on each spade should be turned absolutely upside down; if it is tilted on one side it will start growing to the surface and give a lot of trouble.

A very rough weedy plot should be treated differently. Undoubtedly the best plan is to pare off the sod. To do this very speedily a turf cutter and turfing iron are needed; it is a long and laborious task lifting the sod with the spade. The sod pared off should be made into a stack and burnt at once in a slow, smother fire, the resulting material being spread on the surface ground. The land is then double-dug in the ordinary way.

A question of winter allotment management of some importance is that of whether to dig the manure in or spread it on the surface. We consider manure spreading to be a dirty method of cultivating, and one which should never be followed. It involves great waste, encourages the enemies of the gardener, and is in every way a very undesirable method of cultivating. Far better to dig the manure in at once, and thus conserve to the full its fertilising value in the soil.

The dug ground of the allotment should be left as rough as possible, so that the frost can break down the lumps. Ground does not look so tidy thus, but it is far better for it, and for the crops which are to follow.

Seeds should be bought early, and not left until the last moment when most of the best varieties will have been sold out. The amateur should not be tempted by specious circulars, catalogues, and advertisements of "cheap lots." These lots cost a fortune in the end, for they mean a whole wasted season. The amateur should go to a reliable seedsman only, a firm with a big name to keep up, and not one that advertises much — big firms get plenty of customers without putting flaring advertisements in the Press.

Spring Notes. — When the spring comes, the amateur finds that every moment of his available time is taken up by sowing or planting the various crops. The first, of course, are artichokes, broad beans, and shallots in February, but these are quickly followed in March by a host of vegetables—indeed we might say that every crop is sown during the first month or six weeks after 1st March. The allotment holder should study the Calendar and act accordingly.

In sowing or planting any crop the tendency is to try to grow too much in one spot. We have known amateurs plant artichokes and main-crop potatoes only 6 ins. apart each way, and yet expect to get a heavy crop. It is a common trick to sow carrots, lettuces, parsnips, spinach beet, turnips, and other crops in rows about five times too thickly. If amateurs could only realise the immense value of thin sowing they would be vastly more successful in their results. For further information on sowing, amateurs should read the article on *Seed Sowing*, published further on.

Kinds and varieties of vegetables is another important matter in the spring. It is a very good plan to have as many different kinds of vegetables on the allotment as possible, for a change of vegetables is very pleasant and desirable. As regards varieties, amateurs are apt when they have once found a named variety of a vegetable to do well, to stick to it. This is a very great mistake. New varieties of our well-known vegetables ought certainly to be tried as often as possible by amateur allotment holders, and as small packets of these can be obtained from certain seedsmen advantage should be taken of them to try new varieties which are frequently so far in advance of anything grown previously.

It is in the early spring that the first attack has to be made on the weeds. Before April is half through it will be hard indeed to tell which are crops and which weeds. The push hoe is ideal for surface weeding, and the pull or draw hoe for cutting up well-established weeds. Care has to be taken during the first hoeing not to injure the crops in the rows as well, and this care is specially needed in the case of salsafy, which when it first appears is almost indistinguishable from grass. Supposing the weeds get a good start before the rows of crops show, a good plan is to stretch the garden line along each row, and hoe to within 2 ins. of each side of it.

Slugs and other pests will be very troublesome in the early spring among the young crops. We find that old soot is invaluable for checking these marauders. It is dusted freely over the rows, and renewed every time rain falls. Lime can also be used, but this is apt to burn the foliage. Wireworms can be trapped by means of sunken pieces of turnip and potato.

In the spring, the thorough thinning out of allotment crops will be a matter of some considerable importance. This should have been reduced to a minimum by extremely thin sowing, since much time and seed are wasted by thinning out the crops. The thinning should, of course, be done on a damp day, and the earth should be very slightly drawn up to the rows to fill in the holes thus formed.

Summer Sowings.—There are many crops which are sown in the summer, as the Calendar will show. Probably the most important of these is the spring cabbage, which should be sown in firm ground in June, July, or August according to the district.

Inter-cropping becomes of importance in the summer. It is a great mistake to leave land lying idle for a day longer than it need. Get some crop sown or planted in it, even if it is only spinach, and so prevent waste. Everyone, for instance, should grow spinach beet for winter and spring use. This can follow ordinary spinach, which is taken off in early September when sown in June on land just cleared of early peas. With luck a gathering may be got early in November, after which cutting will be continuous from February or March to July.

Constant weeding and hoeing throughout the summer will be needed if the garden is to be kept clean and the crops to get all the food they need.

A question of summer management of allotments is the efficient disposal of weeds. This matter demands careful thought, for on it may depend the future success or failure of the garden. The need for producing manure is great and this should be realised, but if the manure is merely a mass of weed seeds and live roots it will do more harm than good. The question is dealt with in the articles on *Weeding* and *Vegetable Matter*.

Throughout the summer and autumn a sharp eye should be kept for the appearance of any diseases of crops, some of which, notably the Wart Disease of Potatoes, are notifiable to the Board of Agriculture under penalty of a heavy fine.

Autumn Harvesting. — Watering of food crops is a matter of some importance in the summer and autumn. If this is done at all it should be done thoroughly, as is mentioned in the article on *WATERING.*

The special item in the autumn management of allotments is, of course, harvesting and storing the crops. Proper harvesting and efficient storage are items of immense importance, failure to observe them frequently resulting in the total loss of the crop. Particulars of how to harvest and store crops will be found in some of the articles on vegetables in this Dictionary. They are given in many books on gardening, and instructions appear in the autumn in most of the gardening papers.

Autumn Weeding is of some importance, and after that comes the clearing up of the land. All potato haulm should be burnt, and any haulm or growth of crops which are in the least bit diseased should also be calcined and the ashes spread on the land.

Autumn or very early winter double-digging is of great importance, manure being applied at the same time, except in the case of very light sandy soils, which should not have any manure till the spring.

This brings us to the end of our very short sketch of Management of Allotments. In addition to the articles referred to already, allotment holders are advised to read the articles on *AMMONIA*, *LIME*, *MANURING*, *POTASH*, and *SODA*, which are published further on in the Dictionary.—E. T. E.

ALLSPICE.—A name applied to the genus CALYCANTHUS. See *SHRUBS.*

ALLWOODII (*Dianthus Allwoodii.* Nat. Ord. Caryophyllaceæ).—This is a new plant introduced by Messrs. Allwood Bros., obtained by crossing the Perpetual Flowering Carnation with the Garden Pink. It is perfectly hardy and requires no more than ordinary border cultivation. Its flowers partly resemble the Carnation and partly the Pink, while its habit of growth is similar to that of the Pink, but perpetual growing and flowering.

Propagation is easily effected by layers, pipings, or cuttings from May to September, and by root division in March. Pot plants under glass can be forced into bloom during the autumn, winter, and early spring. It is a grand plant for the unheated conservatory and for growing in window boxes, lawn vases, etc. It is very useful for cutting, and the flowers are all sweet-scented. A single plant will live out of doors without propagation for upwards of four years.

Varieties.—The following are recommended :—*Albert* (pale mauve); *Dorothy* (rose-pink); *Harold* (double white); *Jean* (white with violet centre); *Mary* (rose-pink); *Phyllis* (lilac); *Robert* (old rose); *Rufus* (pale maroon); and *Susan* (lilac with black eye). All these flower from May to November, and average 12 ins. in height.

ALMOND (*Prunus Amygdalus*).—See *NUT CULTURE* and *TREES.*

ALMOND-LEAVED WILLOW (*Salix triandra*).—See *TREES.*

ALNUS.—For best species see *TREES.*

ALOE (Nat. Ord. Liliaceæ).

This is a genus of interesting evergreen succulent plants chiefly from the Cape of Good Hope. They are very ornamental for the greenhouse or conservatory, and of easy culture, requiring very little water during the winter months. They are best propagated by suckers in spring. The most suitable soil is sandy loam and peat, with a little decayed leaf-mould, and plenty of brick and lime rubbish, to ensure good drainage. Temperature required 45–55° F.

Greenhouse Species:—*Aloe abyssinica*.—Yellow. Flowers from June to July. Height, 2–3 ft.

A. glauca.—Red. Flowers from April to May. Height, 2–4 ft.

A. plicatilis.—Reddish-yellow. Flowers from June to July. Height, 2–6 ft.

A. saponaria.—Red. Flowers from July to August. Height, 2–4 ft.

A. striata.—Scarlet. Flowers from July to August. Height, 2–4 ft.

ALONSOA (MASK FLOWER. Nat. Ord. Scrophulariaceæ).—This is a most useful and brilliant flowering plant, suitable for pot culture, for the greenhouse or conservatory. It also does well in the open in a warm sunny spot. Propagation is best effected by cuttings or seeds. The former should be inserted in sandy loam in August or March under hand-light or frame in slight heat; the seeds in February or March in gentle heat. The best soil is light rich sandy loam and leaf-mould. Temperature required 45–55° F.

Greenhouse Species and Varieties:—*Alonsoa linearis*.—Scarlet. Flowers from June to August. Height, 1–2 ft.

A. linifolia.—Scarlet. Flowers from June to August. Height, 1–2 ft.

A. myrtifolia.—Scarlet. Flowers from June to August. Height, 1–2 ft.

A. Warscewiczii.—Crimson. Flowers from July to August. Height, 1–2 ft.

ALOPECURUS (FOX-TAIL GRASS. Nat. Ord. Gramineæ).—This is a large genus of grasses of no very great consequence to gardeners. Probably the best known is *A. pratensis* (Syn. *A. obscurus*), and its variety *foliis variegatis*. The BLACK FOX-TAIL GRASS, *A. agrestis* (Syn. *A. purpurascens*), and the ELBOWIT GRASS, *A. geniculatus*, are sometimes grown in the wild garden.

ALOYSIA (LEMON-SCENTED VERBENA. Nat. Ord. Verbenaceæ).—A greenhouse deciduous shrub with lemon-scented leaves, propagated by cuttings of young shoots in spring in gentle heat, under bell-glass or frame, in a soil of good loam, peat and sand. Temperature needed, 35–45° F.

Greenhouse Species.—*Aloysia asperifolia*.—Red. Flowers in July. Height, 1½–3 ft.

A. citriodora (SWEET VERBENA).—Pale purple. Flowers in August. Height, 1½–6 ft.

ALPINE AURICULAS.—See *AURICULA*.

ALPINE BLADDER FERN (*Cystopteris alpina*).—See *FERNS AND FERN GARDENING*.

ALPINE CATCHFLY (*Silene alpestris*).—See *SILENE*.

ALPINE CLEMATIS (*Clematis alpina*).—See *CLIMBING AND TRAILING PLANTS*.

ALPINE COMFREY.—See *ONOSMA*.

ALPINE EVERLASTING (*Antennaria dioica*).—See *ANTENNARIA*.

ALPINE FOREST HEATH (*Erica carnea*).—See *HEATHS*.

ALPINE GARDEN.—See *ROCK GARDEN: MAKING A*; *ROCK GARDEN: MANAGEMENT OF*, etc.

ALPINE HARD FERN (*Lomaria alpina*).—See *FERNS AND FERN GARDENING*.

ALPINE HOUSE.

This is yet in its infancy, but it will some day be the most popular glass structure in the garden. The plants which may be grown therein are most fascinating, and the wealth and variety of bloom available, from the New Year to Midsummer, is quite equal to that in heated greenhouses or conservatories. From July onwards there are fewer flowers, it is true, but interest is kept up by the neat and compact pans of foliage in varying shades and forms.

The charm of the Alpine House, however, lies in the fact that choice and early flowering rock plants can be viewed in all their beauty, spotless and unsoiled, in comfortable surroundings, when outside conditions prevail that do not allow daily visits to the rock garden; also that plants which are difficult to cultivate outside, adapt themselves to indoor treatment and can be grown with every prospect of success.

Our own Alpine House is a well-built rather low span-roof structure, with a central pathway and side stages. It has a shelf running along the back of each stage, for the benefit of plants that require to be grown in the lightest position possible. It runs east and west, and is glazed as all houses should be, so as to admit the maximum of light.

We find that shading is necessary during the sunniest part of hot days, since if the temperature rises unduly the plants do not remain long in bloom. Roller blinds are a convenient means of shading.

Ventilation is an important point, and sufficient air must be admitted night and day to keep the atmosphere fresh and cool, excepting foggy days and keen frosty nights.

Some Suitable Subjects.—Below we give a list of some of the best of the many suitable plants for the Alpine House. Many will be found fully described under their generic names in alphabetical order in this work:—

Adonis amurensis.
Androsace carnea, A. Chumbyi, A. primuloides.
Anemone blanda.
Asperula Gussonii.
Campanula alpina, C. Allionii, C. pulla, C. Steveni nana, C. pusilla.
Crassula Saracaulis.
Daphne rupestris.
Dianthus alpinus, D. neglectus.
Draba Aizoon.
Drosera rotundifolia, D. longifolia.
Gentiana verna.
Hepatica triloba.
Lewisia Cotyledon, L. Howellii.
Meconopsis aculeata M. integrifolia, M. quintuplinervia, M. puniceus.
Mertensia primuloides.
Morisia hypogaea.
Nierembergia rivularis.
Œnothera pumila.
Oxalis adenophylla, O. enneaphylla.
Phyteuma comosum.
Pinguicula vulgaris.
Primula capitata, P. conspersa, P. denticulata, P. denticulata alba, P. farinosa, P. farinosa alba, P. scotica, P. Forrestii, P. frondosa, P. Juliae, P. hirsuta nivea, P. marginata, P. marginata grandiflora, P. Marven, P. Reidii, P. viscosa, P. P. J. H. Wilson.
Rhododendron intricatum.
Saxifraga Boydii, S. bursiculata, S. burseriana Gloria, S. diapensioides, S. Faldonside, S. Griesbachii, S. Irvingii, S. longifolia, S. oppositifolia, S. Paulinae, S. Petraschii, S. retusa, S. squarrosa, S. thessalica, S. valdensis.
Sedum obtusatum, S. pulchellum, S. spathulifolium.
Sempervivum arachnoideum, S. Chrysanthemum, S. giganteum, S. Laggeri.
Shortia galacifolia, S. uniflora grandiflora.
Wahlenbergia (Edraianthus) serpyllifolia major.

Bulbous Plants.—Many are most suitable for the Alpine House. Some of the best include:—

Chionodoxa sardensis.
Crocus biflorus, C. Sieberi.
Cyclamen neapolitanum, C. neapolitanum album, C. repandum.
Fritillaria aurea.
Galanthus cilicicus.
Iris histrioides, I. Vartani.
Muscari azureum, M. botryoides album.
Narcissus Bulbocodium, N. cyclamineus, N. triandrus albus.
Puschkinia libanotica.
Scilla bifolia.
Triteleia (Milla) uniflora.
Tulipa Batalinii, T. pulchella.

General Culture.—For growing alpines indoors it is best to use pans of 6–10 ins. in diameter. The smaller pans will accommodate single specimens, such as *Primula denticulata, P. Winteri, Saxifraga longifolia,* and similar plants. In the larger pans, three or four plants such as the Kabschia Saxifrages may be planted, and small pieces of rock placed in as divisions between the plants; these are beneficial and help the appearance of the pan on the whole. Most plants will flourish in good gritty soil, in well-drained pans. Saxifrages like a little limestone grit in the compost. For plants which like peat it is wise to use the best brown fibrous.

During the growing season abundance of water is necessary, but stagnation of the soil must be avoided. During the winter the plants need very little water. Saxifrages may be grown in the house all the year round, and when not in bloom look quite interesting; most of the other plants may be placed outside in a sunny position when not in bloom, excepting the Primulas, which like shade. During October, place all plants in cold frames, and from here transfer to the house as the blooming season approaches. Bulbs must be potted up as soon as received, and the pans stood up to the rims in ashes, till growth commences, when they should be placed on the shelves in the house without delay. With a little practice, neat pans are made up, but plants of the Aubrietia and Arabis type will be banned, since there is enough material amongst the choicer alpines that will always keep the house cheery and interesting.—D. L.

ALPINE PINK (*Dianthus alpinus*).—See *Dianthus*.

ALPINE PLANTS DISLIKING LIME.—See Rock and Alpine Plants in *Lime Haters*.

ALPINE POPPY (*Papaver alpinun*).—See *Poppies: Rock Garden Species*.

ALPINE ROSE—The same as Rose des Alpes.

ALPINE SEA HOLLY (*Eryngium alpinum*).—See *Eryngium*.

ALPINE STRAWBERRIES. — See *Strawberries*.

ALPINE WALL-FLOWER (*Cheiranthus alpinus*).—See *Cheiranthus*.

ALPINE WINDFLOWER (*Anemone alpina*). — See *Anemone: Rock Garden Species*.

ALPINE WOODSIA (*Woodsia alpina*).—See *Ferns and Fern Gardening*.

ALSIKE CLOVER (*Trifolium hybridum*).—See *Trifolium*.

ALSINE.—Now included in the genus *Arenaria*.

ALSTROEMERIA (Herb Lily and Peruvian Lily. Nat. Ord. Amaryllidaceæ).—This is a rather small group of hardy and half-hardy tuberous-rooted plants some of which are valuable for garden decoration, while others make nice plants for pots in a cool greenhouse or conservatory.

Propagation.—The tuberous roots may be divided in spring and re-planted in light warm soil. Alstroemerias are also readily increased by seeds, which should be sown either in autumn or early spring in a warm greenhouse in pots or pans of light well-drained open soil. The seedlings when large enough to be handled should be pricked out and grown on under glass until May, when they should be gradually hardened off and finally planted out in their permanent positions in June if of a hardy sort, if only half-hardy they should be "potted on."

Cultivation. — The hardy Peruvian Lilies require a light rich sandy soil. If the natural soil of the garden is very stiff and cold, it is worth while taking it out to a depth of 2 ft. and replacing it by a mixture of leaf-mould, sand, old rotten manure, and light loam, all mixed together. Once a clump is established it should not be disturbed for some years, as none of the family like removal oftener than is necessary. The best of the half-hardy or indoor varieties is *A. pelegrina* (or *peregrina*), the

Lily of the Incas. It is necessary to grow this in pots in most parts of the British Isles. A compost made up of leaf-mould, light loam, and sharp sand will suit this and all the species and varieties that must be grown in greenhouses and cold frames.

Varieties.—Of these the following are undoubtedly the best:—

Alstroemeria aurantiaca. — An orange-red sort and one of the best plants we have for herbaceous borders. It is excellent for cutting, and blooms from June to August. Its height is 3 ft.

A. chilensis.—A July blooming species with flowers of soft shades of rose, red, pink, and pale yellow, with darker marking. Height, 2 ft.

A. haemantha (Syn. *A. pulchella*).—This is a half-hardy species with long narrow tubular crimson flowers tipped with green. It blooms freely throughout the summer, and averages 3 ft. in height.

A. pelegrina (Lily of the Incas).—This is only half-hardy, but is a good pot plant for a cool greenhouse. The type has pretty pinkish flowers, spotted with red-purple, and blooms in July. *A. p. alba* has pure white flowers which are very beautiful. Both are excellent for cutting, and average 1–1½ ft. high.

A. pulchella.—Syn. *A. haemantha*, which see.—J. J. & E. T. E.

ALTAI PRIMROSE (*Primula altaica* or *P. vulgaris Sibthorpii*).—See *Primula*.

ALTERATION OF CHARACTER OF GARDEN, THE LAW ON. — See *Gardening Law*.

ALTERATIONS.—See *Garden Alterations*.

ALTHAEA (Hollyhock. Nat. Ord. Malvaceæ).—This is a genus of hardy annuals, biennials, and perennials of very easy culture. The first section being unimportant, we have decided to omit it. The biennials are raised and treated in the usual way for hardy or half-hardy biennials, while the culture of the perennial species are fully described in our article on *Hollyhock*, also under that name and under Mallow in our article on *Medicinal Herbs*.

Biennial Species.—We recommend the following:—

Althaea caribæa.—This is by some considered a variety of *A. rosea* described in the next section, but has many distinctive characters. It bears large solitary rose flowers with a yellow base from July onwards, and grows about a yard in height.

A. ficifolia.—This bears pretty yellow or orange flowers from July to August, and grows about 2 yds. in height.

A. Sieberi.—This bears purple flowers about the same time as *A. caribæa*, and grows 3–5 ft. in height.

Perennial Border Species.—We recommend the following:—

Althaea cannabina.—This and its variety *narbonensis* bear purplish flowers from July to August, and average 4–7 ft. in height.

A. officinalis (Marsh Mallow).—This, referred to under Mallow in our article on *Medicinal Herbs*, bears pale rose flowers from July to August, and averages 4–5 ft. in height.

A. rosea (Common Hollyhock).—This is the parent of the garden Hollyhocks, hybrids of which are given in our article on *Hollyhock*. The type bears red flowers from July to September, and grows 4–8 ft. high.

See also Hollyhock and Mallow in *Medicinal Herbs*.

ALUM ROOT.—See *Heuchera*.

ALYSSON.—See *Alyssum*.

ALYSSUM (Madwort. Nat. Ord. Cruciferæ).—This genus contains many plants which are extremely popular for spring bedding or for the adornment of the rock garden. All are dwarf, and most of them are perennial, but one species is annual.

A. maritimum (Syn. *Koeniga maritima*).—This, known as SWEET ALYSSON or SWEET ALYSSUM, rarely exceeds 4 ins. in height; it has small, deep green leaves and is of spreading habit. Its flowers are white, honey-scented, and very small, but so freely produced that the plants are a mass of snowy white in late spring and summer. Sow seeds in March, in light soil in the open. If a dwarf compact variety is grown, it is best propagated by means of cuttings in spring or autumn. *Little Dorrit*, *minimum* and *compactum*, are varieties specially suitable for bedding. If these are clipped closely as soon as the first crop of blooms fade, they will flower freely a second time the same year. The common type grows wild abundantly in some parts of southern England and on the cliffs in the Channel Islands, but it is considered to be a garden escape, and not a native species.

Rock Garden Species. — About half a dozen perennial species, including all the dwarfer kinds, are suitable and thrive in well-drained sandy loam in a sunny position. Some may be increased by division of roots in autumn or spring, and all by cuttings in July or by seeds in heat in March.

Alyssum alpestre.—Forms a carpet of hoary leaves on very short stems. Flowers bright yellow. Site sunny. Soil gritty. Flowering Period, May to June. Height, 3 ins.

A. argenteum.—This is of shrubby habit. Leaves entire, silvery. Flowers bright yellow. Site sunny. Soil loamy. Flowering Period, May to June. Height, 1 ft.

A. montanum.—A dwarf carpeting plant with hoary leaves. Flowers large bright yellow, sweetly scented. Site sunny. Soil sandy loam. Flowering Period, May to July. Height, 3 ins.

A. saxatile (ROCK MADWORT).—A tufted plant, with sub-shrubby stems. Leaves evergreen, hoary. Flowers rich yellow in masses. Site sunny. Soil gritty or loamy, well-drained. Flowering Period, April to June. Height, 9 ins.

A. saxatile citrinum. — A pale yellow sort.

A. serpyllifolium.—Like *A. alpestre* in habit, but smaller in all parts. Flowers bright yellow. Flowering Period, May to June. Height, 3 ins.

A. spinosum.—This forms a dense bush of spiny woody branches. Leaves small, hoary. Flowers white. Flowering Period, June to August. Height, 1 ft.

AMALGAMS. — See *MERCURY COMPOUNDS*.

AMARACUS.—Now included in the genus *ORIGANUM*.

AMARANTH.—Another name for *LOVE LIES BLEEDING*.

AMARANTUS.—See *LOVE LIES BLEEDING*.

AMARYLLIS (BELLADONNA LILY. Nat. Ord. Amaryllidaceæ).—Only one species, the best from the ordinary man's point of view, is now included in this genus of half-hardy bulbs. This, *A. Belladonna*, is available in many colour forms such as pink, rose, flesh-colour, crimson, and white. It blooms from June to September, and averages 2 ft. in height. Culture is fairly simple; planting outside should only be done in warm sheltered sites where the soil is light, deep, and moderately rich. The bulbs should be set 5 or 6 ins. deep and protected with litter in the winter. They are handsome pot subjects requiring none but the usual treatment, though plenty of water is necessary when they are flowering.

It may be well to add that there are many hybrids requiring stove treatment. A fair proportion of these are now put under the genus *Hippeastrum* by botanical experts, though the last is now divided into very numerous sub-genera such as Asclemia, Lais, Macropodastrum, etc. etc., which include the majority of the Amaryllises of to-day. The Kew authorities refer a number of the species to the genera *Crinum*, *Ixiolirion*, *Sternbergia*, and *Zephyranthes*, all of which receive separate treatment under these names. As stove species are excluded from the present edition of this work we are not describing any here.

NEW VARIETY.

Amaryllis Belladonna speciosa purpurea.—A fine sort, with the outer half of its petals deep purple.

AMATEUR GARDENER.

Opinions differ as to the exact meaning of the term "amateur gardener." We regard it to include all those who garden for the love of the thing and not for profit. Amateurs often have to employ a professional gardener to help them, but some regard those who employ gardeners as outside the meaning of the term—which is obviously absurd. Where, however, the garden is run for both pleasure and profit, *i.e.* subjects are grown for the market, the holder of such a garden is no longer an amateur.

AMBLIRION.—Now included in the genus *Fritillaria*.

AMBLYOLEPIS.—Now included in the genus *Helenium*.

AMBROSIA (Nat. Ord. Compositæ).

Two species of this, *A. artemisifolia* and *A. trifida* (Syn. *A. integrifolia*), are sometimes offered in catalogues as "choice plants with Aster-like flowers." Both are subjects to be avoided, the latter specially so as it is the well-known GREAT RAGWEED, a ubiquitous plant bearing coarse yellow flower heads most of the summer on plants 1–3 ft. high.

AMELANCHIER.—For the best species see *Shrubs*.

AMERICAN ARBOR VITAE (*Thuya occidentalis*).—See *Trees*.

AMERICAN ASPEN (*Populus tremuloides*).—See *Trees*.

AMERICAN BARBERRY (*Berberis canadensis*).—See *Shrubs*.

AMERICAN BLADDER-NUT (*Staphylea trifolia*).—See *Shrubs*.

AMERICAN BLIGHT.—See WOOLLY APHIS in *Insect Pests*.

AMERICAN CHESTNUT (*Castanea dentata*).—See *Trees*.

AMERICAN COWSLIP.—See *Dodecatheon*.

AMERICAN CRAB APPLE (*Pyrus coronaria*).—See *Trees*.

AMERICAN CRANBERRY (*Oxycoccus macrocarpus*).—See *Shrubs*.

AMERICAN CRESS.—See *Cress* and *Winter Cress*.

AMERICAN DROP-SEED GRASS.—See *Muehlenbergia*.

AMERICAN ELM (*Ulmus americana*). See *Trees*.

AMERICAN GOOSEBERRY MILDEW. See under GOOSEBERRY MILDEW in *Diseases of Plants*.

AMERICAN HOLLY (*Ilex opaca*).—See *Holly*.

AMERICAN HORNBEAM (*Carpinus americana* and *C. caroliniana*).—See *Trees*.

AMERICAN HORSE MINT (*Monarda Punctata*).—See *Monarda* and *Pot-herbs*.

AMERICAN IPECACUANHA (*Gillenia stipulacea*).—See *Gillenia*.

AMERICAN LARCH (*Larix occidentalis* and *L pendula*).—See *Trees*.

AMERICAN MOUNTAIN ASH (*Pyrus americana*).—See *Trees*.

AMERICAN PLANTS.

One of the most interesting sections of plants that has come to us from America is the Ericaceous, and many of these are familiar objects to all who take an interest in gardening. We are indebted to the infusion of the strain of American Rhododendrons for the bulk of the garden hybrids of this fine family of evergreen flowering shrubs; and although in themselves the native forms of these plants are not very attractive, our garden would suffer materially were it not for the hardy strain that has been made available by the crossing of the American native species with the Himalayan and other species, which have produced the fine garden hybrids so well known all over this country. Seen in their native habitat the American Rhododendrons have a charm of their own, and through the Eastern States, and running south for a considerable way, they form one of the predominant undergrowths, and in Tennessee and the Carolinas when full blown are a fine sight.

In conjunction with them are other plants of the same family, and amongst the most showy is the *Kalmia latifolia*, or, as the American calls it, the Mountain Laurel, or sometimes the Calico Bush.

In the Arnold Arboretum at Boston there is a fine border of these plants originally gathered from the woods, which presents a gorgeous display when in full bloom. Other forms of Kalmia dominate certain districts. The writer has walked through miles of *Kalmia angustifolia*, commonly called the Sheep Laurel, in New Brunswick, where it forms, in conjunction with *Kalmia glauca*, *Ledum palustre*, and the Native Azaleas, the scrub growth upon "The Barrens" of this territory. *Ledum palustre* and *L. latifolium* are two good subjects. The former is called The Labrador Tea plant, and, as its name implies, extends to the far North. A noticeable feature of these is the scent derived from the foliage when crushed or bruised, the leaves emitting a pungent odour.

There is also the dwarf *Ledum buxifolium*, a charming little plant seldom seen in this country now, although at one time quite plentiful.

The writer cannot understand why these plants are not more used in gardens where Ericaceous plants thrive, as at the time of blooming they give an excellent show, and are always attractive plants when doing well. The Andromedas, with which one couples the Leucothoes, are also beautiful plants and well worthy of a position in any garden, and the best of these, as a garden plant, is undoubtedly *Andromeda floribunda*, but *A. speciosa* is a very attractive plant, as also is *A. Catesbaei*, the latter being a valuable plant for garden purposes, thriving well in the shade, and during the winter the foliage assumes different bronzy hues which are most attractive.

Probably one of the most attractive plants in the American woods is the American Dogwood (*Cornus florida*), both white and pink flowered, the latter not being so common, but a most beautiful form. In the spring the woods are alive and gay with the blossom, and in the autumn the brilliant red fruit is one of the dominant features, and, in addition, the foliage is one of the most attractive, so far as autumn colouring is concerned. It seems a great pity that such a beautiful tree should not be more successful in this climate. There are, however, a few good examples of it in England.

The Tree Andromeda (*Oxydendron arboreum*), also called *Andromeda arborea*, is also a most striking tree, attaining a height of some 50 ft., and when in flower during July and August is a most lovely sight, and also has the advantage of turning to beautiful tints in the autumn.

Another plant family that cannot be passed over in discussing American subjects is the Vaccinium, and from a garden point of view the plants are valued both for their fruits and autumnal colouring. Those who have been in America will certainly remember the Vaccinium family with gratitude if they happen to have encountered Blueberry pie, which is one of the standing dishes during the autumn months in the Northern States. *Vaccinium corymbosum* is one of the most brilliant of the autumn colouring plants, and is widely distributed as a scrub plant throughout New England. *Vaccinium pensylvanicum* is also one of the most striking features of ground-covering plants, and on poor land, where it is so frequently met with, the brilliance of its foliage is unsurpassed in the autumn season.

In connection with autumn tints it is impossible to pass over the Oaks, Maples, and Liquidambar without comment, and these trees in their many varieties give us all the brilliant reds of autumn, which, mixed with the lovely golden tints of the Tulip Tree, once seen can never be forgotten, while the undergrowth, consisting of many brilliant shrubs, some of which have already been noticed, together with the Stag's Horn Sumach (*Rhus typhina*), *Viburnum cassinoides*, *Pyrus nigra*, *Pyrus melanocarpa*, and the lovely Sassafras, assists in the gorgeous medley of colour. One striking feature, which the writer always attributes to the climate, is the well-doing of hard-wood shrubs and trees and the prolific bearing of fruit.

The spring season in America does not start until winter is completely past. There are rarely late frosts, and all the flowering trees and shrubs develop without check. The ripening influence of the autumn weather enables complete maturity to be established, and from year to year there is invariably a great crop of berries and fruits of all kinds.

A visit to the Arnold Arboretum during the winter season is a great treat to any lover of berry-bearing trees. The many species of Hawthorns which Professor Sargent has collected from all parts of the States may be seen in full fruit, and their brilliant-coloured berries are one of the features of the landscape at that season. The limited space available does not admit of anything further than touching on the fringe of all the many beautiful wild flowers and so on that are encountered while travelling through the States. Spring, summer, and autumn the woods and wild fields are ablaze with colour, and are a constant source of interest.

With very few exceptions the American trees and shrubs are capable of being grown in any part of the British Isles, and those which do not succeed are for the most part from the North-Eastern States, and it is probably due to the fact that our winters are usually too soft, and the effect of this condition is to keep the plant in a constant desire to grow, instead of ripening off in the autumn and hardening up for the rigorous winters they have to withstand.

It is a curious fact that many of the trees and shrubs of North America from West of the Rocky Mountains are much more easily grown in England than in the Eastern States, and typical instances are to be found in the fine Conifers seen here growing to perfection, such as the Wellingtonia, Lawson's Cypress (*Cupressus lawsoniana*), *Thuiopsis borealis*, and perhaps the best of all the Douglas Fir, none of which are good trees in the Eastern States and seldom seen, except in collections of enthusiasts.

English gardens are much indebted to America for many interesting and beautiful shrubs, and without giving an exhaustive list one might place the family of Ericaceous plants as the most easily grown and perhaps giving the greatest effect, Rhododendrons, Kalmias, Ledums, Vacciniums, and others being as much at home here as in their native homes.—F. G. W.

[Regarding the cultivation of American plants an open soil will suit them well, even if it may be inclined to be on the poor side. Peat is an addition to the soil which most American plants appreciate; this can be dug in when the land is being prepared, and again with a little rotted manure at the close of each winter season. Many American plants abhor lime, and this fact should be remembered when making ready for planting.—Editor.]

AMERICAN RED PLUM (*Prunus americana*).—See *Trees.*

AMERICAN SPANISH OAK (*Quercus falcata*).—See *Trees.*

AMERICAN SPINDLE TREE (*Euonymus americanus*).—See *Climbing and Trailing Plants.*

AMERICAN WEEPING WILLOW (*Salix purpurea pendula*). — See *Trees.*

AMERICAN WHITE OAK (*Quercus alba*).—See *Trees.*

AMIANTHIUM.—Now included in the genus *Zygadenus.*

AMMOBIUM. — See *Everlasting Flowers.*

AMMONIA AND AMMONIUM COMPOUNDS.—If the gardener looks down the list of a horticultural sundriesman he will see figuring in places of honour in the fertiliser section compounds prefixed by the word Ammonia or Ammonium. Thus we have ammonia or ammonium carbonate, chloride, nitrate, phosphate, and sulphate. If the gardener asks himself the question, "What is ammonia?" he comes to the unsatisfactory conclusion that it is a gas quite invisible to the naked eye but strangely assertive of its presence as regards the naked nose. If, however, the gardener asks the same question of a chemist, this gentleman will reply that ammonia is a compound of nitrogen and hydrogen, that its formula is NH_3, that its molecular weight is so-and-so, that its density is something else, and that to all intents and purposes it behaves by uniting with acids and forming salts, just as if it were any one of the well-known metals, such as cadmium, calcium,[1] iron, lead, nickel, potassium, sodium, tin, or zinc. For our purpose in the present article we shall consider it as if it were a metal, since it will be simpler for us to do so rather than enter into details concerning it being a "bi-elementary compound."

The pure substance is difficult to obtain and has little practical value in the garden. Dissolved in water, however, it is useful. This liquid is really a weak solution of ammonium hydroxide. As far as we are aware, the pure hydroxide has never yet been isolated, since it decomposes into ammonia and water. "Strong" ammonia has a limited application in the garden, since the vapour burns the foliage. It is said, however, to be an effectual means of slaying the tiresome bean aphis. We understand the method adopted is to pass swiftly along the bean rows holding the spout of an uncorked bottle of ammonia close to the aphis-covered stems meanwhile, and after passing down the rows twice, the aphis are easily syringed off with warm water. A very weak solution of ammonia has been found of slightly advantageous effect as a fertiliser to leaf-bearing vegetables, but it is little used. See also *CHEMISTRY FOR GARDENERS*.

AMMONIUM CARBONATE is a compound of very little importance. It can be used, as can also the better known

AMMONIUM CHLORIDE (*sal-ammoniac*), as a winter or early spring dressing for heavy land to which it is desirable to apply some richly nitrogenous manure. One ounce to the square yard will be enough.

AMMONIUM NITRATE is one of the very best stimulants, and were it cheaper its application would be wide. We consider there is nothing like it for stimulating leaf-crops. It is certainly the fastest fertiliser that we know of.[2] Owing to the extraordinary amount of nitrogen it contains, the gardener should be most careful never to apply it in too great a quantity or to plants capable of getting nitrogen for themselves from the air, as can all plants of the order Leguminosæ. One-fourth ounce to the gallon of water very occasionally will be quite enough to apply; to give more would be to court disaster.

AMMONIUM PHOSPHATE.—This is more use to the exhibitor than to the practical gardener. It induces high quality into both flowers and vegetables; and exhibitors of Sweet Peas and many florists' flowers could hardly do without it. One-fourth ounce per gallon of water very occasionally can be used as a stimulant, but for exhibition purposes it can be used more often. It can be scattered on the ground at the rate of ¼–½ oz. per 9 sq. ft., and well hoed in.[3]

AMMONIUM SULPHATE.—This

---

[1] Most gardeners will never have seen metallic sodium or potassium. It is unlikely that they will have seen metallic calcium either, though it was made by the ton certainly up to the beginning of the war, by electrolysis of fused calcium chloride. —EDITOR.

[2] Ammonium Nitrate is quicker in its action than is nitrate of soda er even nitrate of potash. It is probably the fastest fertiliser we shall ever have. —EDITOR.

[3] Care should be taken when purchasing to get the pure substance.—EDITOR.

is probably the most popular as well as the most widely used of all ammonia compounds. Almost every gardening book informs us glibly that it is made in the manufacture of coal-gas. The ammoniacal liquor there produced is neutralised with chamber acid (dilute sulphuric acid), and the compound "sublimed." Its manufacture, however, is of little interest to the average gardener; what is more important to him are its uses and its purity. Samples of sulphate, nitrate, and phosphate of ammonia in water should be tested with blue litmus paper, and should the solution turn it red, the samples should be rejected as unfit for use.

Sulphate of ammonia is a quick stimulant but milder than nitrate of soda. One ounce of it can safely be put into each gallon of water, but the liquid should be used only for those plants or crops in which it is desired to produce much leafage. Sulphate of ammonia should never be used for potatoes, neither for Jerusalem artichokes; in the first case it will produce a tangled undergrowth of haulm, and in the second the main stem of the artichokes will shoot up heavenwards until it disappears almost completely from view! In both cases the crop of tubers resulting will be hardly worth digging.

Test for Ammonia Compounds.—The five above-named salts of ammonia are all of them very easily adulterated with various other cheaper chemicals. This adulteration continues unchecked in spite of the Fertilisers and Feedings Stuffs Act. However, there is a simple test for adulteration which every gardener can make and should make for himself prior to the purchase of a large consignment. A small quantity of any or all the compounds is put on a hot shovel and the shovel put into the fire again. If unadulterated there will in a few minutes be nothing left on the shovel. If, however, a residue amounting to half or even a quarter of the tested sample remains, that sample is not pure, and consequently should be rejected, as the impurities, whatever they may be, are almost certain to prove injurious to plant life.—E. T. E.

AMMONIACAL COPPER CARBONATE.—This is sometimes used as an insecticide. The proportions are

Copper Carbonate .	½ lb.
Ammonia . .	1 gal.
Water . .	90 gals.

The liquid should be applied with a syringe in the ordinary way.

AMMONIACAL LIQUOR.

This consists chiefly of ammonia, and if available near at hand should be largely used in the garden. Vegetable refuse which is rotting down may be thoroughly soaked with it once a week until it is dug in, and the value of the latter as manure will certainly be doubled if such a practice is adopted. Heaps of road manure, the fertilising value of which is comparatively poor, may with great advantage have frequent soakings of this liquid, and after decomposing down for a few weeks their value will be enormously increased. Immediately after such a soaking the heap or heaps should be thoroughly well dusted with powdered gypsum or covered with soil to prevent the escape of the Ammonia. A very impure form of this known as GAS TAR WATER or GAS LIQUOR has a strong pungent odour and is of some use as a soil insecticide. A quart of this in 10 gals. of water will, it is said, completely clear any plot of pests if a thorough soaking of the liquid is given.

AMMONIUM COMPOUNDS.—See *AMMONIA AND AMMONIUM COMPOUNDS.*

AMMOPHILA (MARRAM GRASS. Nat. Ord. Gramineæ).—This is an unimportant genus of grasses to which little attention need be paid by gardeners. The best known species is *A. arundinacea* (Syn. *A. arenaria*), known as SEA MAT-WEED, used for binding sand in sand dunes together on the North Wales coast, North-West of England, and other districts.

AMOOR PINK (*Dianthus dentosus*).—See *DIANTHUS.*

AMORPHA.—For the best species see *SHRUBS.*

AMOUNT OF SEED REQUIRED.—See *SEED : AMOUNT REQUIRED.*

AMPELOPSIS.—See under VITIS in *CLIMBING AND TRAILING PLANTS.*

ANACHARIS.—Now included in the genus ELODEA.

ANACYCLUS (Nat. Ord. Compositæ).—This is an unimportant genus of hardy annuals not of much garden value. For descriptions of the somewhat numerous species larger works should be consulted.

ANAGALLIS (PIMPERNEL. Nat. Ord. Primulaceæ). — Even the native Pimpernel, *A. arvensis,* is a popular plant, and one which has been known also as the POOR MAN'S WEATHER GLASS for long past. Most of the species in cultivation are of annual duration and have been improved by selection and cultivation. All those named below are easily raised from seeds sown in a warm position in March or April :—

Anagallis arvensis (Syn. *A. phoenicea*).—This has red flowers, but its variety *caerulea,* with blue flowers, is a better garden plant. Both bloom from June to August, and average 12 ins. in height.

A. latifolia is now referred to *A. arvensis* and is synonymous with *A. indica,* but a plant grown under these names is a blue-flowered trailer which blossoms throughout the summer.

A. linifolia (Syns. *A. collina* and *A. Monelli*).—This was formerly more extensively grown than now. It has flax-like leaves clothing its slender stems and surmounted by clusters of brilliant blue flowers, each half an inch across. *Grandiflora* is a name given to dwarf, large flowered, variously coloured varieties of this species. One member of this group, named *Willmoreana,* is 6 ins. high, and has bright purple-blue flowers with yellow eye. Other good varieties are *Napoleon III* (maroon); *Parksii* (red); *Phillipsii* (Syn. *A. Brewerii*) (red); and *sanguinea* (ruby). They are not often met with nowadays.

Creeping Species. — One species cannot very well be passed over without mention. This, *A. tenella,* the pretty little BOG PIMPERNEL, is a perfectly hardy subject bearing pink flowers in July, and averaging 3 ins. high. Once planted in the rock garden it will spread rapidly, so must not be set near choice subjects.

ANALYSIS OF PLANT ASHES. — See *ASHES OF PLANTS : ANALYSIS OF.*

ANAPELTIS.—Now included in the genus POLYPODIUM, for which see *FERNS AND FERN GARDENING.*

ANASTATICA. — See *RESURRECTION PLANT.*

ANBURY.—See under CLUBROOT in *DISEASES OF PLANTS.*

ANCHISTEA.—Now included in the genus WOODWARDIA, for which see *FERNS AND FERN GARDENING.*

ANCHOR PLANT (*Colletia cruciata*).—See *SHRUBS.*

ANCHUSA (ALKANET. Nat. Ord. Boraginaceæ). — Of the large number of species which have been described in this genus some few are annuals—these we may neglect as being unimportant—others are half-hardy biennials, while still others are among the most useful of hardy herbaceous perennials of very easy culture. All the species are good bee plants, but none are desirable for use as cut flowers.

Biennial Species.— These being half-hardy require to be sown in boxes or pans in a cold frame in the spring-time and potted up when the seedlings have made a few rough leaves. They should be shifted into larger pots as they require room, and in October transferred to a greenhouse from which frost is just excluded, from which they may be safely planted out in a sunny position the following May. The best species is :—

Anchusa capensis. — This bears blue flowers in July on stems 18 ins. high.

Perennial Border Species.—These require the usual treatment for hardy perennials, and most are handsome border plants forming large bushes which need efficient staking. They may be raised from spring or summer sown seeds, or propagated by root cuttings in July. As they do not stand the winter well in cold wet districts, planting is best postponed till March. If the plants are cut down immediately after flowering and well looked after in the way of water and manure, they very often bloom again in September or October. We recommend the following species :—

Anchusa arvensis (Tausch).—Syn. *A. officinalis,* which see.

A. azurea.—Syn. *A. italica,* which see.

A. Barrelieri.—This bears pretty blue flowers from July onwards, and averages half a yard in height.

A. italica (Syn. *A. azurea*).—This is quite the most popular species of all with its glorious bright blue flowers in June on plants 3–5 ft. in height. The best variety of this is *Dropmore,* often known as the DROPMORE ALKANET, a bright blue, unspeakably lovely and quite impossible to describe. Other good sorts include: *Lissadell Variety* (clear sea-blue); *Opal* (pale sky-blue); *Perry's Variety* (rich dark blue); *Picotee* (white, with blue margins); and *Pride of Dover* (pale opal blue). All these bloom about the same time as the type and average a similar height.

A. myosotidiflora.—This is a pretty blue sort suitable for the rock garden. It blooms from July to August, and averages about 9–12 ins. in height.

A. officinalis (Syn. *A. arvensis,* Tausch).—This, the COMMON ALKANET, with its blue flowers in August, is more suitable for the wild garden or shrub border than for the perennial parterre. It grows about 2 ft. in height.

A. sempervirens. — This bears bluish flowers from July onwards, and averages 1–2 ft. in height.

[The names of the plants formerly classed as Anchusas, but now included by the Kew authorities in other genera, are purposely omitted from the present article.—EDITOR.]

ANCISTRUM.—Now included in the genus *ACAENA.*

ANDROMEDA.—For the best species see *SHRUBS.*

ANDROPOGON (BEARD GRASS. Nat. Ord. Gramineæ).—This is an unimportant genus of grasses of little garden value. They are easily grown in a warm corner in the wild garden. Larger works should be consulted for lists and descriptons of species, etc.

ANDROSACE (Nat. Ord. Primulaceæ).—**Annual Species.**—In this genus of exquisitely beautiful alpine plants there are a few which, if not strictly annuals, rarely flourish unless treated as such. The Persian *Androsace filiformis,* the European *A. maxima,* and the Siberian *A. lactiflora* (Syn. *A. coronopifolia*) may be referred to in this connection, and the last named is the best.

Culture.—Sown in autumn and protected during the winter by an unheated frame, plants of *Androsace lactiflora* should be planted out in spring on a sunny ledge in the rock garden. A mixture of peat, leaf-mould, sand, and limestone chips should be provided, and if the plants are set 4–5 ins. apart so as to make a little colony, the effect will be very beautiful in early summer when these 6-inch high gems carry their pure white flowers above the rosettes of smooth leaves. Self-sown seedlings will succeed in positions where they do not suffer from the dampness of our winter, but it is always a safe plan to protect a few plants in case of accidents. Both *Androsace filiformis* and *A. maxima* bear white flowers and average 6 ins. in height. *A. lactiflora*, which bears bluish-white flowers, resembles *A. lactea* in habit (see below), and is of the same height as the two last named.—C. H. C.

Rock Garden Species.—There are a large number of species, but many are difficult to cultivate. About a dozen may be considered suitable for the ordinary rock garden. Most of these will thrive in well-drained gritty soil in sunny positions or on rocky ledges. They are propagated by division in autumn or spring, cuttings in July, layering in summer, or seeds in March, and in wet districts require the protection of a square of glass from October to March.

Androsace arachnoidea.—A tufted plant, with silvery woolly leaves in small rosettes. Flowers white. Site sunny. Soil gritty and peaty. Flowering Period, June to July. Height, 3 ins.

A. carnea.—This produces dense mats of bright green foliage in tufts. Flowers blush-pink in heads. Site half-shade. Soil grit and peat. Flowering Period, June. Height, 3 ins. There is also a variety with white flowers.

A. Chumbyi (Syn. *A. sacramentosa* x *villosa*).—A free-growing species with silky leaves in rosettes on short stolons. Flowers rosy-pink in umbels. Site sunny. Soil gritty. Flowering Period, May to June. Height, 4 ins.

A. foliosa.—A robust species, with long grey-green leaves in tufts. Flowers rosy-lilac in large umbels. Site sunny. Soil limestone. Flowering Period, May to August. Height, 6 ins.

A. lactea.—Leaves long, pale green, and in rosettes. Flowers white with yellow centre. Site shade. Soil limestone. Flowering Period, June to August. Height, 6 ins.

A. lactiflora (Syn. *A. coronopifolia*).—A biennial species resembling the above in habit. Leaves broader. Flowers bluish-white in large umbels. Site half-shade. Soil gritty. Flowering Period, June to July. Height, 6 ins.

A. Laggeri.—This forms wide mats of bright green foliage. Leaves narrow. Flowers rosy-pink. Site half-shade. Soil gritty and peaty. Flowering Period, March to May. Height, 3 ins.

A. lanuginosa.—This produces long trailing branches clothed with silvery white leaves. Flowers rose-colour in terminal umbels. Site sunny. Soil gritty. Flowering Period, June to September. Height, 6 ins.

A. l. oculata (Syn. *A. Leichtlini*).—Flowers white, with crimson eye. Plant otherwise similar to the above.

A. sarmentosa.—This forms broad patches with rosettes of pale green, silky, hairy leaves at the end of stolons. Flowers bright rose, in large umbels. Site sunny. Soil gritty. Flowering Period, June to August. Height, 4 ins.

A. sempervivoides.—Leaves in

rosettes like a Sempervivum. Flowers rosy-purple. Site half-shade. Soil gritty. Flowering Period, May to June. Height, 3 ins.

A. villosa.—This produces small rosettes of densely woolly leaves in loose clusters. Flowers pale rose with yellow centre, sweetly scented. Site sunny. Soil gritty. Flowering Period, June to July. Height, 3 ins.

A. villosa Chamaejasme (ROCK JASMINE).—Flowers open pure white and gradually become blush-pink, otherwise similar to the above.

NEW SPECIES AND VARIETIES.

Androsace ciliata.—This has rose flowers with a crimson eye, and large leaves in rosettes. Its height is 1 in.

A. Laggeri Warley Variety.—This has dark rose flowers with a yellow eye. It is a remarkably free flowering sort.

ANEMIA.—For the best species see *FERNS AND FERN GARDENING.*

ANEMIDICTYON.—Now included in the genus ANEMIA, for which see *FERNS AND FERN GARDENING.*

ANEMONE (WINDFLOWER. Nat. Ord. Ranunculaceæ).—Anemones are hardy herbaceous perennials and tuberous-rooted plants ranging in height from 4 ins. to 2½ ft. So widely distributed is the genus that Anemones can be utilised in practically all aspects in the garden, and can be had in bloom nearly all the year round. Propagation is effected by seed, also by division of tubers and of rootstocks.

Culture.—Seed may be sown when ripe or in spring. Division of tubers or of roots should be done in the dormant season. *Anemone japonica* thrives best in a rich cool loam in semi-shade, while *A. Pulsatilla* is partial to an open calcareous medium in full sun. Ordinary garden soil is suitable for most of the other species and varieties.

USES.—*A. japonica* with its hybrids are useful for providing cut flowers with long stems in the autumn, bloom being obtainable from August to October. The tuberous section, including the POPPY ANEMONE (*A. coronaria*), and the alpine varieties (see below) are largely used on rockeries and for bedding. Their flowering period ranges from February till July.

Varieties.—The best of *A. japonica* include:—Elegantissima, Kriemhilde, Lady Ardilaun, Mount Rose, Prince Heinrich, and Whirlwind.

Tuberous Section.—The best include:—A. apennina, A. blanda, A. coronaria, A. fulgens, and A. nemerosa.—J. L. G.

Rock Garden Species.—This large family includes Hepatica and Pulsatilla, and nearly a dozen are described below and are suitable for the rock garden. They thrive in deep loamy soil, some in open positions, others in half-shade, and are increased by division of roots in autumn or spring. Most species may also be increased by seeds sown in gentle heat in March.

Anemone alpina (ALPINE WINDFLOWER).—Leaves much divided and fern-like. Flowers large and pure white. Site sunny. Soil rocky limestone. Flowering Period, May to June. Height, 1–1½ ft.

A. angulosa.—Leaves in rosettes, on long stalks, and three-lobed. Flowers blue, pink, and white. Site half-shady. Soil deep loam. Flowering Period, April to May. Height, 6 ins.

A. blanda (GREEK ANEMONE).—Leaves deeply divided in three on short stems. Flowers deep blue, rose, and white. Site open or half-shady. Soil loam. Flowering Period, February to April. Height, 4 ins.

A. Hepatica (Syn. *Hepatica triloba*).—Leaves three-lobed on short stems. Flowers blue, rose, and white. Site half-shady. Soil loam and limestone. Flowering Period, March to May. Height, 4 ins.

A. montana.—Leaves finely divided. Flowers deep violet and gold. Site open. Soil loam. Flowering Period, June. Height, 1 ft.

A. narcissiflora (Daffodil Anemone).—Leaves deeply divided. Flowers white in large umbels. Site half-shady. Soil rocky loam. Flowering Period, May to June. Height, 9–12 ins.

A. palmata.—Leaves bright green. Flowers golden-yellow. Site sunny. Soil sandy loam. Flowering Period, April to June. Height, 9 ins.

A. patens.—Leaves finely divided. Flowers delicate purple. Site half-shade. Soil deep loam. Flowering Period, May to June. Height, 12 ins.

A. Pulsatilla (Pasque Flower).—Leaves much divided. Flowers violet with golden stamens. Site open. Soil calcareous. Flowering Period, April to June. Height, 1 ft.

A. sulphurea.—A yellow-flowered *A. alpina.* Soil non-limestone. Flowering Period, May to June. Height, 1 ft.

A. sylvestris (Snowdrop Anemone[1]).—Leaves divided. Flowers sweet-scented, white, and nodding, on long stalks. Site open. Soil loamy. Flowering Period, April to June. Height, 1 ft.—W. I.

Up-to-date Selections.

Anemone coronaria Everton Strain.—Scarlet and violet-blue.

A. pavonina High Hall Strain.—Salmon, red, rose, etc., and centre black.

See also under Pasque Flower in *Medicinal Herbs.*

---

[1] Snowdrop Windflower is the Kew name for this.—Editor.

ANEMONE RUST.—See *Diseases of Plants.*

ANEMONOPSIS (Nat. Ord. Ranunculaceæ).—One species of this genus, *A. macrophylla*, a hardy herbaceous perennial not unlike *Anemone japonica*, is well worth growing. It bears lilac-purple flowers in July, and grows 2–4 ft. in height. Its cultural requirements are of the simplest; it merely requires to be planted in good rich loam in November or March, and divided at a similar period once in four or five years.

ANEMOTHECA.—See *Perennials, Half-Hardy: List of.*

ANETHUM.—Now included in the genus *Peucedanum.*

ANGEL'S TEARS (*Narcissus triandrus*).—See *Narcissus Species.*

ANGELICA (Nat. Ord. Umbelliferæ).—This is a small genus of hardy biennials or short-lived hardy perennials more suitable for the water garden or wild garden than for the borders. They grow to a large size, often attaining 10 ft. in height when flowering, and their numerous leaves are quite handsome. They are splendid town garden plants. The stalks may be used for candying, and the plant has a medicinal value. See article on *Medicinal Herbs.* *A. Archangelica*, a favourite species used in confectionery, is now known as *Archangelica officinalis.* See notes on *Archangelica.*

ANGELICA TREE (*Aralia spinosa*).—See *Shrubs.*

ANGRÆCUM.—See *Orchids.*

ANGUILLIDÆ.—See Eelworms in *Insect Pests.*

ANGULOA.—For the best species see *Orchids.*

ANIMAL CHARCOAL.—See *Charcoal.*

ANIMAL MANURES.—See under General Manures in *Manures.* See also *Cow Manure, Horse Manure, Pig Manure, Sheep Manure*, etc.

ANIMATED OR WILD OATS (*Avena sterilis*).—See *Ornamental Grasses.*

ANISEED.—See *Medicinal Herbs.*

ANISETTE.—See Edible Fungi in *Fungi.*

ANISOGONIUM. — Now included in the genus Asplenium, for which see *Ferns and Fern Gardening.*

ANISOPTERIX.—See under Winter Moths in *Insect Pests.*

ANISOTOME.—Now included in the genus *Aciphylla.*

ANISUM.—Now included in the genus Pimpinella.

ANNUAL CLIMBERS.—See *Climbing and Trailing Plants.*

ANNUAL MEADOW GRASS (*Poa annua*).—See *Poa* and *Weeds.*

ANNUAL POPPIES.—See *Poppies.*

ANNUAL SUNFLOWERS.—See *Sunflower.*

ANNUALS FOR ALL PURPOSES.

Annuals may be defined as plants which are raised from seed, bear flowers, and die in the same season, sometimes, but not in all cases, producing or ripening seed. In gardening practice, however, many plants are treated as annuals which are properly biennials or perennials. Others are of annual duration in this country, while in the warmer climate from which they originate they are of perennial habit. Of this class the climbing and dwarf Nasturtiums (*Tropaeolum majus* and *nanum*) are examples.

Hardy Annuals are such as may be sown direct in the open ground in March or April, and will withstand the varying changes of our spring; some, indeed, may be sown in the late summer or early autumn to stand the winter, coming into bloom earlier than the others. By sowing late—up to June—late blooms may be had. Autumn sowing is not advisable in cold and northern districts.

Half-hardy Annuals are of more tender constitution, and to get them sufficiently forward, so that they shall bloom in due course, they must be sown under glass in February, March, or April; or they may be sown out of doors when fear of late frosts is past, but are then later in blooming. [In exposed districts outdoor sowing should be avoided, since frequently the plants fail to bloom.—Editor.]

Greenhouse Annuals are even more tender, and call for more warmth and greater care in the early stages. They are often used for summer bedding, but mainly for conservatory and indoor decoration.

Culture of Hardy Annuals.—As a general rule, these require a sunny position to be seen at their best. The soil should be well dug, and if a moderate amount of manure is given, the results will be finer. Rake the soil smooth before sowing, and in all cases sow thinly. Small seeds need not be covered with more than their own depth of soil; larger ones can have from a quarter of an inch (in the case of, for example, Convolvulus minor) to half an inch (Nasturtiums). [For details of culture, readers are referred to our article on *Annuals, General Culture of.*—Editor.]

Culture of Half-hardy Annuals.—These should be sown thinly in boxes or pots, using a soil composed of fine loam, with a little leaf-mould and sand. Drain the boxes, and having put in the soil to within half an inch of the top, give a good watering, and when the surplus water has drained off, sow the seed thinly. If it is very small, do not cover it with soil, but merely press it in with a smooth board; for larger seeds sprinkle a little fine soil evenly over the surface. Stand the boxes in the greenhouse or frame, or, failing these in a room indoors, and keep them shaded until the seedlings appear then give them light and air. As soon as the first pair of leaves are made, prick the young plants out into other boxes or pots, and return them to the frame or greenhouse, giving them full light after a day or two. Water carefully; excess is harmful, and leads to DAMPING-OFF (which see in *DISEASES OF PLANTS*). When they have made sufficient growth they may be potted off singly; and later on they can be hardened off (see *HARDENING OFF*) in readiness for planting out.

CULTURE OF GREENHOUSE ANNUALS.—These should be sown in February or March, and require more heat than half-hardy annuals. Prick them out singly into small pots as soon as they can be handled, and continue to grow them on briskly, shifting them into larger pots as required. If they are wanted for summer bedding, they must be gradually hardened off towards the end of May, preparatory to planting out some time in June.

HARDY ANNUALS FOR BEDS AND BORDERS.

Adonis autumnalis.
Agrostemma Coeli-rosa (Rose of Heaven).
Anchusa capensis.
Argemone mexicana (Prickly Poppy).
Arnebia cornuta.
**Bartonia aurea.*
**Calendula officinalis* (Pot Marigold).
*Calliopsis (also called *Coreopsis*).
*Candytuft (*Iberis*).
Centranthus macrosiphon.
**Chrysanthemum carinatum* and *C. coronarium* (summer flowering).
**Clarkia elegans.*
Collinsia bicolor.
Convolvulus minor.
*Cornflower (*Centaurea Cyanus*).
**Erysimum Perofskianum.*
*Eschscholzia (Californian Poppy).
Eutoca viscida.
Gilia.
*Godetia.
**Gypsophila elegans.*
Hawkweed (*Hieracium*).
*Larkspur (*Annual Delphinium*).
Lavatera trimestris.
Leptosyne Stillmannii.
Linaria maroccana.
Linum grandiflorum.
*Love-lies-bleeding (*Amarantus caudatus*).
Lupine (several species).
Malope grandiflora.
*Mignonette.
*Nasturtium.
*Nigella (Love-in-a-Mist).
*Poppy (Shirley, Carnation-flowered, and Paeony-flowered).
Salvia Horminum.
Saponaria Vaccaria.
**Schizanthus grandiflorus.*
Schizopetalon Walkeri.
Silene Armeria.
*Sunflower (*Helianthus annuus*, etc.).
*Sweet Pea.
*Sweet Scabious.
*Sweet Sultan (*Centaurea*).
Venus's Looking-Glass (*Specularia*).
Viscaria.

FOR EDGING.

Alyssum maritimum (Sweet Alyssum).
Asperula azurea setosa.
Calliopsis (dwarf varieties).
Eucharidium Breweri.
Gilia (dwarf varieties).
Iberis umbellata (dwarf varieties of common Candytuft).
Kaulfussia amelloides.
Leptosiphon.
Limnanthes Douglasii.
Medicago Echinus.
Nasturtium (dwarf varieties).
Nemophila.
Phacelia campanularia.
Platystemon californicus.
Sanvitalia procumbens.
Saponaria calabrica.
Silene pendula.
Sphenogyne speciosa.
Virginian Stock (*Malcomia maritima*).

FOR CARPETING.

Alyssum maritimum (Sweet Alyssum).
Candytuft (dwarf).
Leptosiphon.
Nasturtium (dwarf).
Nemophila insignis.
Phacelia campanularia.
Sanvitalia procumbens.
Silene pendula compacta.

FOR ROCKWORK.

Æthionema Buxbaumi.
Alyssum maritimum (Sweet Alyssum).
Asperula azurea setosa.
Corydalis glauca.
Kaulfussia amelloides.
Leptosiphon.

---

* Indicates plants useful for cutting.

Limnanthes Douglasii.
Meconopsis heterophylla.
Nemophila.
Sanvitalia procumbens.
Silene pendula.
Sphenogyne speciosa.
Venus's Navelwort (*Omphalodes linifolia*).

FOR SPRING BLOOMING.

Alyssum maritimum (Sweet Alyssum).
**Asperula azurea setosa.*
**Bartonia aurea.*
*Candytuft (*Iberis*).
*Clarkia.
Collinsia bicolor.
**Erysimum Perofskianum.*
*Godetia.
Leptosiphon.
Leptosyne Stillmannii.
Limnanthes Douglasii.
Linaria maroccana.
Nemophila.
Poppy.
Saponaria calabrica.
Silene Armeria and *pendula.*
Sphenogyne speciosa.
Violet Cress (*Ionopsidium acaule*).
Virginian Stock (*Malcomia maritima*).

FOR AUTUMN BLOOMING.

By late sowing many of the annuals already mentioned can be had in bloom in autumn. The following can be relied upon if sown as late as the end of June :—

Alyssum maritimum.
Candytuft (*Iberis*).
Leptosiphon.
Limnanthes Douglasii.
Violet Cress (*Ionopsidium acaule*).
Virginian Stock (*Malcomia maritima*).

Others that will bloom at this season are: Clarkia, Cornflower, Godetia, *Gypsophila elegans*, Lavatera, Malope, Mignonette, Nasturtium, Sweet Pea, Sweet Sultan.

HALF-HARDY ANNUALS FOR BEDDING.

**Ageratum mexicanum.*
Alonsoa Warscewiczii.
**Arctotis grandis.*
Aster (*Callistephus*).
Cacalia coccinea.
Cleome gigantea.
Convolvulus major.
**Cosmos* (Mexican Aster).
Diascia Barberae.
Gaillardia picta.
Helipterum.
Kochia trichophylla (Summer Cypress).
Mina lobata.
Morning Glory (*Ipomoea imperialis*).
*Namaqualand Daisy (*Dimorphotheca aurantiaca*).
*Nicotiana (Tobacco Plant).
Perilla nankinensis.
Phlox Drummondii.
Rudbeckia bicolor.
*Salpiglossis.
Salvia Blue Beard.
**Schizanthus Wisetonensis.*
**Senecio elegans* (Jacobaea).
**Statice sinuata.*
*Stocks.
*Tagetes (African and French Marigold).
Zinnia.

Most of these bloom until autumn.

FOR EDGING.

Ageratum (dwarf).
Arctotis calendulacea.
Brachycome iberidifolia (Swan River Daisy).
Marigold (dwarf French).
Mesembryanthemum crystallinum (Ice Plant).
Nemesia.
Phlox Drummondii.
Pimpernel (*Anagallis*).
Portulaca (Sun Plant).

FOR ROCKWORK.

Arctotis calendulacea.
Brachycome iberidfolia.
Mesembryanthemum album and *M. tricolor.*
Pimpernel (*Anagallis*).
Portulaca.
Sedum coeruleum.

ANNUALS FOR "EVERLASTINGS."

Acroclinium.
Helichrysum.
Rhodanthe.
Statice sinuata.
Xeranthemum.
Etc., etc.

These are best treated as half-hardy annuals. See also article on EVERLASTING FLOWERS.

GREENHOUSE ANNUALS.

Balsam (*Impatiens*).
Browallia.
Celosia (Feathered Cockscomb).
Ricinus.
Solanum Melongena (Egg Plant).
Torenia Bailloni.

W. J. C.

---

* Indicates plants useful for cutting.

ANNUALS FOR CITY GARDENS.—See *Town and City Gardening.*

ANNUALS FOR SEASIDE GARDENS. See *Seaside Gardens: Plants and Trees for.*

ANNUALS: General Culture of.

There are a great many gardeners who tell one they can never succeed in growing annuals, and this fact is astonishing. There is no real difficulty in the way of cultivating most annuals, yet there are a few little points which are essential for success.

Sow Thinly in April.—Unless annuals are sown in the autumn, which to my mind is not to be strongly commended, they should be sown in April, and preferably during the first week.

Previous to this the soil should be dug up and some rotten manure worked in *well down.* This last is important, for the roots of the annuals ought to have to go and find the manure. If possible all the digging should be done more than a month before sowing, to let the soil become quite firm again.

The position where the seeds are to be sown should be lightly raked over, and for Mignonette trodden firm, or the seed may be lost in the air crevices.

It goes without saying that the dwarfest annuals should be sown closest to the edging of the plot, with the taller ones behind. So I pass on to the seed sowing itself. Annuals should mostly be grown in sunny positions.

Sow *thinly*—that is essential. Small seed should be mixed with about ten times its bulk of fine sand or soil, and the whole distributed evenly over the ground. The bed may then be lightly covered with fresh fine soil, and made firm with a trowel. Do not under any consideration apply even a small quantity of fertiliser when sowing, for besides not requiring it, it may be positively harmful to the annuals at this early stage.

Generally speaking, it is best to sow annuals in clumps, and these should be of good size. Clarkias, Godetias, Love-in-a-Mist (*Nigella*), and Shirley Poppies look specially well in clumps.

As soon as the seedlings are an inch or two high, thin rigorously if needed. This thinning must be repeated three or four times if the seedlings come up too thickly. Well-grown specimens of Clarkia, Godetia, or Mignonette want plenty of room —6 ins. apart, finally, is none too much.

Stake Early.—Annuals are quick-growing subjects and are easily broken down by rain, and blown about. Thus ties and stakes should be supplied at an early date. Several sticks can be arranged round the outside of a clump, and bast stretched from one to the others. Sunflowers require a single stake, of course, and it must be a strong one. As the annuals grow give extra ties, and it is very unlikely that they will look anything but tidy and beautiful.

Watering, etc.—Many annuals are very fond of water, and this should be given *liberally* during the summer months. If lawn mowings or old hotbed manure be spread round the roots this will help to conserve the moisture.

Clarkias, Mignonette, and many others may be used for cutting; and cut them with no hesitation. On no account let dead flowers remain on any annual, or it will cease flowering. Cut them off at once as soon as formed: such work might well be done every day, and even then that would not be too often. It is unnecessary to give lists of annuals, as these can be found in the article on *Annuals for All Purposes* already given.

This is but a brief sketch of the culture of annuals. In so short an article one cannot do more than give the main points.—E.

ANNUALS, HALF-HARDY: List of. [The following selection of these contains the cream of those in cultivation and will prove useful to many readers.—EDITOR.]

	Inches
Ageratum Heavenly Blue. Slate blue. May to September.	12–24
Alonsoa Warscewiczii. Red, pink. April to September.	9
Amarantus. Red foliage. April to October.	12–24
Anagallis caerulea. Rich blue. May to October.	6
Asclepias Curassavica. Red. June to November.	24
Aster sinensis. Various. July to November.	12–24
Balsam. Various, pink. June to October.	18
Begonia (fibrous-rooted). Crimson, white. June to October.	12
Browallia elata. Blue and white. June to September.	18
Calceolaria. Yellow, red, bronze. Spring, autumn.	12–20
Canna indica. Red, yellow. July to November.	18–36
Carnation semperflorens. Various. July to December.	18
Celosia cristata. Crimson, orange, white. August to December.	10–24
Celosia plumosa. Crimson, yellow, red. August to December.	10–24
Celsia Arcturus. Yellow. June to December.	15
Cheiranthus kewensis. Cream to mauve. July to November.	24
Chrysanthemum Leucanthemum. Various, white. June onwards.	30
Cineraria. Various. Spring and autumn.	15–30
Clianthus Dampieri. Scarlet and black. July to December.	24
Coleus. Foliage various. June to December.	24
Cosmos. Crimson. Yellow, pink. September to December.	18–48
Cuphea miniata. Scarlet. June to October.	12
Cyclamen persicum. Pink, white, crimson. October onwards.	12
Cyperus. Foliage. May onwards.	18
Datura meteloides. White. July onwards.	36
Dimorphotheca aurantiaca. Salmon, orange. June to November.	12

	[Ins.]
Exacum affine. Mauve. July to October.	9
Exacum macranthum. Violet. July to October.	18
Freesia refracta. White, various. August onwards.	12
Gilia coronopifolia. Scarlet-crimson. May to October.	36–48
Gladiolus (early flowering). Various. August to September.	30
Gloxinia. Various. August onwards.	10–12
Gomphrena globosa (Globe Amaranth). Various. Everlasting. July to October.	12
Hebenstretia comosa. Orange and white. June to November.	18
Helipterum. Various. Everlasting. July onwards.	12
Hibiscus Manihot. Primrose yellow and crimson. June to September.	40
Impatiens. Orange, red, pink, liliac. June to November.	18
Ipomoea rubro-caerulea. Pure sky-blue. May to October.	Climber
Lantana. Various warm colours. June onwards.	12
Loasa aurantiaca. Orange. July to November.	Climber
Lobelia. Blue, white, crimson. June onwards.	6–10
Lophospermum scandens. Pink. June to November.	Climber.
Martynia fragrans. Mauve. July to October.	24
Mesembryanthemum tricolor. Crimson and white. July to September.	3
Mina lobata. Scarlet, cream. July to October.	Climber
Nemesia Suttoni. Scarlet, blue, orange. June to October.	6–9
Nicotiana affinis. Crimson, pink, white. May to October.	18–30
Nycterinia selaginoides. Pale blue, orange. June to September.	12
Pentstemon. Various. June to November.	12–24
Perilla nankinensis. Bronze foliage. June to October.	12–20
Petunia. Pink, purple, white. May to October.	12–24
Phlox Drummondii. Carmine, apricot, etc. June to September.	6–12
Portulaca. Scarlet, white, yellow. June to September.	6
Primula obconica. Lilac, white, crimson. October onwards.	10
Primula sinensis. Pink, white, carmine. November onwards.	10
Pyrethrum aureum (Golden Feather). Foliage various, golden. Flowers cream-white. June to December.	5–9

	[Ins.]
Rhodanthe. Pink, white, crimson. Everlasting. July.	9–12
Ricinus Gibsonii. Bronze foliage. July to November.	24
Salpiglossis. Various. June to October.	15
Salvia Bruantii. Scarlet. August onwards.	15
Schizanthus. Various. July to December.	12–24
Streptocarpus. Violet, rose, white. July to December.	12–15
Torenia. Violet-blue and white. August onwards.	12
Trachelium caeruleum. Pale blue. July to September.	18
Verbena. Various. July to November.	6
Zinnia. Scarlet, apricot, pink. June to October.	15–30

I. L. R.

[Some of the above are half-hardy perennials, or belong to other sections, but they are most conveniently grown by treating them as half-hardy annuals in the manner described in our article on *ANNUALS FOR ALL PURPOSES*.—EDITOR.]

ANNUALS, HARDY.—See *ANNUALS FOR ALL PURPOSES* and *ANNUALS: GENERAL CULTURE OF.*

ANOMATHECA.—Now included in the genus *LAPEYROUSIA*.

ANSELLIA.—See *ORCHIDS*.

ANTENNARIA (CAT'S-EAR. Nat. Ord. Compositæ).—These are low-growing silvery-foliaged plants, forming carpet-like tufts, and useful in the rock garden. They are propagated by dividing the roots in autumn or spring.

Rock Garden Species.—Only one need be described here :—

Antennaria dioica (ALPINE EVERLASTING[1]).—Leaves in small rosettes, hoary. Flowers pink in heads. Site sunny ledges. Soil deep, gritty. Flowering Period, June to July. Height, 3 ins. The variety *tomentosa* (Syn. *A. candida*) has larger silvery leaves. It is a quick grower and very dwarf.

ANTHEMIS (CHAMOMILE. Nat. Ord. Compositæ).—The common Chamomile (*Anthemis nobilis*) is a well-known medicinal plant, and as such is dealt with in our article on *MEDICINAL HERBS*. Some few are annuals, some are evergreens, but the hardy herbaceous perennials are the most grown for garden purposes.

Culture.—This is a matter of considerable ease. Ordinary common soil suits the plants admirably, and experience has shown that they are not particular as to the position. They are easily increased by division of the roots in the autumn or spring and by seeds also in the spring. Planting may be done any time during the winter months up to early April.

Perennial Border Species.—A good many so-called species of hardy plant specialists are excluded, since they are synonymous with species of other genera. The following are recommended :—

Anthemis fruticulosa.—This is a white sort which is in bloom in late July and August. It rarely exceeds a height of 24 ins.

A. tinctoria.—This is the sort most usually grown in gardens. The range of colour includes various shades of yellow, also white. It blooms from June to August, and the height varies from 12 to 24 ins. There are several varieties, such as *Kelwayi* and *Mrs Brooks.*

Rock Garden Species.—There are only three or four species suitable for the rock garden. These are dwarf and will thrive in well-drained sandy soil. Propagate by dividing the roots in spring, or by seeds sown in heat in March.

Anthemis Aizoon.—See *Achillea ageratifolia.*

A. biebersteiniana. — Leaves in tufts, silvery. Flowers bright golden-yellow. Site sunny. Soil sandy loam. Flowering Period, June to July. Height, 1 ft.

---

[1] MOUNTAIN CUDWEED is the Kew name for this.—EDITOR.

A. cupaniana.—A trailing sort with silvery foliage. Flowers white. Site sunny. Soil sandy. Flowering Period, June to September. Height, 1 ft.

A. montana.—Leaves in rosettes on sub-shrubby stems, much divided and silvery. Flowers yellow on long stalks. Site sunny. Soil sandy loam. Flowering Period, May to June. Height, 1 ft.

A. styriaca.—Leaves silvery in tufts. Flowers white. Site sunny. Soil sandy loam. Flowering Period, May to June. Height, 4 ins.

See also under CHAMOMILE in *MEDICINAL HERBS.*

ANTHERICUM.—The same as ANTHURICUM. See *ST. BERNARD'S LILY.*

ANTHOLYZA. — See *PERENNIALS, HALF-HARDY: LIST OF.*

ANTHOMYIA.—See RADISH FLY in *INSECT PESTS.*

ANTHONOMUS. — See APPLE BLOSSOM WEEVIL in *INSECT PESTS.*

ANTHOXANTHUM (Nat. Ord. Gramineæ).—This is a small genus of hardy grasses of no garden value whatever, but desirable for pasture, etc.

ANTHRISCUS (BEAKED PARSLEY. Nat. Ord. Umbelliferæ).—This is an unimportant coarse-growing genus of biennials or perennials sometimes offered as desirable plants to the unwary amateur by dishonest plant salesmen. The best known species is *A. cerefolium,* the CHERVIL of our salad bowls, the culture of which is described in our article on *SALAD PLANTS.* Other species are *A. sylvestris,* the ROUGH CHERVIL, and *A. vulgaris,* the common BUR CHERVIL. None have any beauty for garden decoration.

ANTHURICUM.—See *ST. BERNARD'S LILY.*

ANTHYLLIS (KIDNEY VETCH. Nat. Ord. Leguminosæ).—This is not a genus of much consequence to gardeners. The best known species are *A. montana* (Syn. *A. jacquiniana*) and *A. Vulneraria,* also known as LADIES' FINGERS. Both are hardy herbaceous perennials best propagated by root division in the spring, and of very easy culture if a light soil is provided; both bear their flowers in July, and both average 12 ins. in height. The first bears purple flowers and the second yellow, though various coloured varieties of each are sometimes listed.

ANTICLEA. — Now included in the genus *ZYGADENUS.*

ANTIGRAMME. — Now included in the genus SCOLOPENDRIUM, for which see *FERNS AND FERN GARDENING.*

ANTIPHYLLA.—Now included in the genus *SAXIFRAGA.*

ANTIRRHINUM (SNAPDRAGON. Nat. Ord. Scrophulariaceæ) is a hardy herbaceous perennial of height varying from 9–30 ins. Its flowers are in many beautiful colours. The plant thrives in ordinary well-drained garden soil, and is propagated by seeds and cuttings.

Culture.—Sow seed from June to August in pans or in the open border. Cuttings may be taken in autumn, and will root readily if kept shaded in a frame or under a hand-light. Side-shoots, taken off with a heel, and having about five pairs of leaves, are suitable. By spring they will be well rooted, and should then be planted out where they are to bloom.

USES.—Antirrhinums are very useful for bedding and for covering dry banks and walls in sunny aspects. Tall varieties make handsome clumps in the herbaceous borders, the dwarf and medium ones lending themselves more to colour schemes in

ANTIRRHINUM

beds. They flower throughout the summer.

Varieties.[1]—These are very numerous. The following are splendid :—

Tall.—Admiration, Amber Queen, Cottage Maid, Fireflame, Mont Blanc, and Nelrose.

Dwarf.—Coccinea, Prima Donna, Sunset, White Prince, and Yellow Queen.—J. L. G.

ANTIRRHINUM : Rock Garden Species.—Only two species of this genus are typical rock garden subjects. These thrive in rock crevices in full sun, and are easily raised from seeds sown in gentle heat in March.

Antirrhinum Asarina (ITALIAN SNAPDRAGON).—Trailing stems and woolly leaves. Flowers white with yellow tip. Site sunny, sheltered. Soil gritty loam. Flowering Period, May to September. Height, 3 ins.

A. glutinosum.—Sub-shrubby trailing stems, forming a bushy plant. Leaves hairy. Flowers yellowish-white, large. Site sunny, sheltered. Soil gritty loam. Flowering Period, May to September. Height, 6 ins.

ANTS.—See *INSECT PESTS.*

APARGIA.—Now included in the genus LEONTODON.

APHACA.—Now included in the genus *LATHYRUS.*

APHANES. — Now included in the genus *ALCHEMILLA.*

APHELENCHUS. — See under EELWORMS in *INSECT PESTS.*

APHIDES. — See APPLE AND ROSE APHIDES in *INSECT PESTS.*

APHIDIDÆ.—See ROSE APHIDES or GREEN AND RED FLY in *INSECT PESTS.*

APHIS.—See APPLE, BEAN, PLUM, and ROSE APHIS in *INSECT PESTS.*

APHIS BRUSH.—See *GARDEN TOOLS.*

APIUM (Nat. Ord. Umbelliferæ). This is a small genus of biennial plants which are not quite hardy. Three distinct species find a place in the *Kew Hand-list of Herbaceous Plants*, but only one of these is grown to any large extent, namely, *A. graveolens*, and its variety *rapaceum*, better known as CELERY and CELERIAC respectively. On each of these we devote a separate article, to which we refer our readers for details of culture.

APLOPAPPUS (Nat. Ord. Compositæ).—This is a genus of hardy annuals or biennials for the borders, of very easy culture though but seldom grown and of little value. The best known species is *A. ciliatus*, a yellow September blooming plant about 2 ft. in height. For descriptions of other species larger works must be consulted.

APLOTAXIS. — Now included in the genus *SAUSSUREA.*

APONOGETON (CAPE POND FLOWER. Nat. Ord. Naiadaceæ). —This is a useful genus of greenhouse, hardy, and stove aquatics. The first and the last class are excluded as they are beyond our present scope. The best of the hardy section are described under CAPE POND FLOWER in our article on *WATER GARDEN : PLANTS FOR THE.*

APOSERIS. — Now included in the genus *HYOSERIS.*

APPLE (*Pyrus.* Nat. Ord. Rosaceæ). **Culture of.**—A few hints may be useful under this head for the guidance of the enthusiast.

The Best Form of Tree for gardens is the Bush to be trained basin-shaped, or the Pyramid. In the Bush trees the central stem is not allowed to extend. Other forms of trees are dealt with in the General Considerations on Hardy Fruit Culture.

---

[1] Species are not given much attention for bedding and border work. *A. majus*, the COMMON SNAPDRAGON ; *A. nuttallianum*, *A. Orontium*, the CORNFIELD SNAPDRAGON ; *A. speciosum* and *A. tortuosum* are sometimes grown. Most of the species are now included in other genera.—EDITOR.

Newly planted trees will not need any manure for three years unless the growth is feeble; it being important to get trees with some well-ripened wood at the start.

When the trees begin to fruit, the clusters should be thinned to one or two fruits only, and if a tree bears freely, a mulch of rotten dung on the surface in June, to be watered upon in dry weather, will ensure the crop swelling to perfection. If no dung is available sprinkle 4 oz. of a first-class fertiliser to the square yard, hoeing it in, and watering upon it.

It is advisable to change the manure applied to Apples each year, in this rotation—Horse or Cow Dung, Lime, Basic Slag, or Wood Ashes, and Sulphate of Ammonia (2 oz. to square yard).

Manure should, of course, be applied only when the growth is feeble, and not necessarily every year, or the tree will grow wood instead of fruit. Attention to Aphis and Caterpillars must be given before the trouble develops, also to diseases. For information on these points readers should turn up our articles on *APPLE DISEASES* and *INSECT PESTS*.

SELECTION OF VARIETIES.

In the selections which follow, the varieties of apples are placed under the months in which they commence to be fit for use. Many keep in condition for a much longer period, when stored in a properly constructed Fruit House, as described in our article *FRUIT ROOMS AND FRUIT HOUSES*. For example, *Allington Pippin* is classed under November, but it keeps well till April; and *Cox's Orange Pippin* is of the same behaviour. Planters with limited space should choose one or more varieties from each month, and thus prolong the season. Unless a proper store-house is provided, amateurs will do well not to plant varieties named under the heading "February to May."

DESSERT APPLES (EARLIEST).

Mid-July and August. — These should be eaten direct from the tree, as when stored they become mealy, losing crispness and flavour.

Irish Peach (Crofton).—Small, flat, dull red, with white specks. Soft richly flavoured flesh. Growth spreading and moderate. Bears on tips of shoots. Must be well pruned in when young, or the bush will get too spread out. Regular bearer.

Langley Pippin.—New and promising. Resembles *Mr Gladstone* but is larger, and the growth is more vigorous. Very tender flesh of pleasant flavour.

Mr Gladstone. — Medium size, yellow with crimson blotches and streaks. Flesh soft and pleasant in flavour; growth moderate and compact. Good bearer.

Red Joanetting.—Medium, conical dull red. Flesh crisp and pleasant. Growth upright and compact. Moderate cropper.

September:—*Devonshire Quarrenden.*—Large, flat, deep crimson. Flesh crisp, flavour rich and sweet; growth compact and upright. Rather uncertain bearer, but worthy of growth on score of quality.

James Grieve.—Large if thinned. Conical. Greenish-yellow, with faint red at times. Flavour briskly acid and pleasant. A Scotch seedling from *Cox's Orange*: valuable for its constant cropping. Grand for small gardens.

Lady Sudeley.—Large—the finest in its season. Flat, angular, richly coloured on sunny side with russet. Strongly perfumed and of rich spicy flavour when fresh from the tree. Growth upright and free. Regular cropper. When orchard-house grown the fruits are bright scarlet.

St Everard.—Large, crimson and yellow. A seedling from *Cox's Orange* and having a smack of its flavour. Growth upright, free, and stout. Good bearer.

Worcester Pearmain. — Medium, conical, bright crimson, with some russet. Flavour crisp and pleasant when left on tree long enough to mature its growth. Habit upright. Regular bearer.

October :—*American Mother.* — Medium, conical, dull red and yellow, often russety. The richest flavoured October apple, bearing every other year. Growth upright and compact. A first-class sort.

Golden Winter Pearmain is a better variety than *King of the Pippins,* and often grown and sold for it.

King of the Pippins.—Medium size, golden, with red dull flush. Soft flesh, sweet pleasant flavour. Growth upright, very compact. Regular bearer.

Maidstone Favourite.—Large, flat, handsome pale yellow, with bright crimson flush. Flavour rich, and flesh crisp. Growth compact. A very promising novelty.

DESSERT APPLES (LATER).

November :—*Allington Pippin.*—Medium size, large when from young trees. Yellow with pretty red flush and stripes. Compact, free growth. Capital bearer. Succeeds well in the North, and is one of the most reliable, keeping till March.

Cox's Orange Pippin.—Medium size, regularly shaped. The best all-round dessert apple. Fails in heavy soils and is worth a wall in the North. Regular bearer, and compact grower. It may be kept in condition till March.

The Houblon.—Medium size. A highly coloured seedling from *Cox's Orange Pippin.* Tree of sturdy growth, bearing well. Fruit of delicious flavour—so far the best of all the Cox's family seedlings.

December :—*Adams' Pearmain.*—Medium size, and of long conical shape, rich deep red, with specks and russet. Delicious flavour. Regular moderate bearer.

Egremont Russet.—Medium size, though rather flat. Rich flavour. Regular bearer.

King of Tomkins Co.—Large, and evenly shaped—rich crimson fruit of extra fine flavour. One of the few American apples that succeed in Britain. Growth free and sturdy. Moderate bearer. A splendid sort.

Roundway Magnum Bonum.—Very large and rough in appearance, colour green, with russet. The writer considers this by far the richest dessert apple. Its size does not suggest dessert use, but once tasted it is sure to find favour. It succeeds as a standard and bears moderately, though of vigorous growth. Cooked in any form it needs no sugar.

February to May :—*Duke of Devonshire.* — Small pale green, russety, keeps without shrivelling. Rich flavour. Regular bearer.

King's Acre.—Large, green and russety, with bronzy colour, and of rich flavour.

COOKING APPLES (EARLIEST).

Mid-July and August.—These sorts can be cooked direct from the tree, or they may be stored for a few days.

Early Victoria (Syn. *Emneth Early*).— Large, bluntly conical. Pale green. Cooks well. Growth free and upright. Good bearer.

Early White Transparent—Medium size, and conical. Pale primrose colour. Brisk acid flavour, and worthy of dessert use. Upright habit and free bearer. Quite first rate.

Grenadier.—Very large, flat, pale green. Cooks well and keeps for two months. Growth free. Good bearer.

September :—*Ecklinville Seedling.*—Very large, and of roundish shape. Pale green and speckled. Flesh soft, and fruit cooks without falling. Growth free. Moderate bearer, but often fully laden.

Emperor Alexander.—Very large; flat. Crimson on sunny side, greenish-yellow on shaded parts. Flesh soft and pleasant—fit for dessert. A noted variety for exhibition. Growth spreading. Free bearer.

Golden Spire.—Medium; conical. Rich yellow. Keeps for two months. Growth compact. A very free bearer.

Stirling Castle.—Large, round and even. The perfection of a cooking fruit, since there are no waste angles. Flesh soft; cooks without falling. Growth moderate. It crops so profusely that growth is often checked. Thus in a young state it must be well pruned to secure a tree before the crop checks growth.

COOKING APPLES (LATER).

October :—*Norfolk Beauty.*—Large round, pale yellow. Cooks without falling. Growth spreading. Good bearer, and very desirable.

Rev. W. Wilks.—Very large, pale yellow. Compact growth. Enormous bearer. A splendid variety.

Warner's King.—Very large, flat, pale green. Cooks well. Growth free, and spreading. Apt to canker in heavy soil; but one of the best.

November :—*Bismarck.*—Large, heavy, flattish, with crimson cheek. Very fine bearer. Compact growth. Cooks well.

Golden Noble.—Medium, good shape, Cooks finely. Bears on spurs wide apart. We consider *Edward VII* (see next month) better.

Royal Jubilee.—Large, pale green, conical. Remarkable for flowering and leafing very late, escaping frosts, and thus missing the ravages of the Codlin Caterpillar. Free bearer. Growth sturdy.

The Queen.—Large, flat, handsome yellow, flushed crimson. Cooks well, and is worthy of dessert use. Growth free, and spreading. Moderate bearer.

December :—*Beauty of Kent.*—Large, conical fruit, of rich yellow colour, with pale crimson flush. Cooks well, and is worthy of dessert use. Free grower. Good bearer.

Edward VII.—See *Golden Noble* above, which it closely resembles but is a better bearer.

Lord Derby.—Large, conical, pale green. Regular bearer. Growth stout and upright.

January :—*Encore.*—Best described as a large *Lane's Prince Albert.* One of the finest recent novelties.

Hamblings.—Large, regularly conical, pale green, heavy. Cooks well. Succeeds in the North. Good bearer when established.

Lane's Prince Albert.—Large, yellow, often flushed red on sunny side. Compact grower, bearing profusely. Indispensable to any garden.

February to May :—*Bramley's Seedling.*—Large, and flat, with eye very deep. Green, with bronzy red flush. Cooks well and keeps splendidly. Very free spreading growth. Good bearer when established.

Newton Wonder.—Large, often highly coloured. A good keeper and cooker, quite worthy of dessert use. Regular bearer, with spreading growth. Superior to *Bramley's Seedling.*

Ontario.—Large and very firm.

Keeps soundly till June. A valuable addition to any orchard. Compact in growth, and bears freely.

Varieties Omitted.—The following are notable varieties and should be included in selections of fifty sorts. They are strongly recommended to those who may already have the thirty varieties described.

FOR DESSERT. — *Chas. Ross* (October and November); *Ellison's Orange* (December); *Lord Hindlip* (late); *St Edmunds* (October); and *Wealthy* (October to November).

FOR COOKING.—*Annie Elizabeth* (keeps up to May); *Blenheim Orange* (November to May); *Lord Grosvenor* (very early); and *Wellington* (late).

Blenheim Orange is rather too strong in growth for gardens, but bears fairly well on the Paradise Stock. *Wellington* is apt to canker in cold soils. *Lord Hindlip* and *Heusgen's Golden Reinette* are fine very late desserts. Every gardener should also have a *John Downie Crab*; it is beautiful in flower; bearing profusely; and giving a wealth of striking scarlet fruits, which are most useful for jam or jelly.

The reason why such varieties as *Ribston Pippin* are omitted is because they are specially liable to canker. If *Ribston Pippin* must be planted, procure trees on the Paradise Stock, and in the North plant only on walls. In conclusion it will be well to point out that *Golden Spire* and *Irish Peach* should be grown in all Northern and Scottish gardens as they are most suitable for cool exposed situations.—G. B.

NEW VARIETIES.

The following are undoubtedly the best :—

Arthur Sheed.—A culinary and dessert variety with medium to large russeted fruits, having a golden and red colouring. It is a heavy and constant cropper, in season from October to March.

Harry Pring.—A culinary variety with large, round, pale green fruits changing to yellow. It is a juicy variety of brisk flavour, and a late keeper, remaining good till May or June.

James Lawson.—A culinary and dessert variety of medium size, with green but red-cheeked fruits. It is a constant bearer and a good keeper, and in season from October to January.

Laxton's Superb. — A dessert variety of medium size, suggesting a *Cox's Orange Pippin* in shape, colouring, and flavour, but coming into season in March.

Monarch.— A culinary variety, with large, round yellow fruits, which are beautifully marked with crimson-scarlet. It is a juicy variety of brisk flavour, and a heavy cropper, in season from October to April.

Parsons' Madresfield Court.—A dessert variety of medium size and conical shape, with attractively coloured, aromatic fruit of *Ribston Pippin* flavour, which is in season from November to February.

Queen Mary.—A dessert fruit of medium size, and golden with crimson colour. It is of good flavour, and an excellent cropper, coming into use in October.

St Cecilia.—A dessert fruit of medium size, green in colour, but prettily marked with crimson. It is of fine flavour (resembling *Cox's Orange Pippin* in this respect), a good bearer, and a very late keeper.

Welford Beauty.—A dessert and culinary variety of medium to large size, with a yellow skin striped with crimson, and of a very handsome shape. It is in season from September to October.

William Peters.—A dessert variety round in shape, of medium size, and with a streaked or crimson mottled skin. It is of excellent flavour, and is in season from September to January.—W. J. C.

See also under PYRUS in *TREES*.

APPLE APHIDES.—See *INSECT PESTS*.

APPLE BITTER PIT.—See under BITTER PIT in *APPLE DISEASES*.

APPLE BLOSSOM WEEVIL.—See *INSECT PESTS*.

APPLE BLOSSOM WILT.—See BLOSSOM WILT in *APPLE DISEASES*.

APPLE BROWN ROT.—See under BROWN ROT in *APPLE DISEASES*.

APPLE CANKER.—See *APPLE DISEASES*.

APPLE DISEASES.

[The following notes on Apple Diseases will be of interest to fruit growers. Apple Scab and Brown Rot are also common to pear trees. The remedies are the same as for apples.—EDITOR.]

Apple Canker (*Nectria ditissima*).—This destructive disease is one of the worst enemies to profitable apple-growing in the British Isles. It is favoured by heavy ill-drained soils. The large rugged cankers start as small depressed areas about a dead twig or wound, becoming marked in their later stages with several more or less concentric rings in the bark. These cankers sometimes completely encircle and kill large branches.

Nectria ditissima being a wound parasite cannot attack uninjured bark, but small injuries open the way to its entrance, and it frequently follows the punctures and cracks produced by the woolly aphis.

REMEDIES.—Spraying is useless against this disease and recourse must be had to the knife. Trees that are cankered and no longer bearing well should be cut down and top grafted with an immune variety such as *Bramley's Seedling* or *Newton Wonder*. Trees that are still vigorous and bearing well, though much cankered, may remain. Boughs and shoots affected with canker should be pruned away and the cut surfaces protected by a coating of painters' knotting, tar, white paint, or even clay. Good drainage is helpful in keeping off canker.

Apple Mildew (*Podosphaera leucotricha*).—This widespread malady attacks the leaves, twigs, and flower buds, causing them to curl up and shrivel and covering them with a white mealy coating of spores. Resting spores are scarce, but the fungus winters in the dormant buds, which on opening become centres of new infection in the spring.

REMEDIES.—The disease must be controlled by pruning. Cut away all infected shoots in autumn and go over the trees again thoroughly at flowering time, removing all buds showing traces of mildew. If in spite of this mildew develops, spraying with lime sulphur (1 part in 30 parts water) will help to check it.

Apple Scab (*Venturia inaequalis* and *V. pirini*).—Scab is an exceedingly common and general disease attacking apples and pears, the black specks or blotches, or large unsightly cracks depreciating the mature fruit, while the fruit attacked early in the season is deformed and often falls from the tree. Scabbed apples do not keep well and are liable to rot. The disease appears first as olive-coloured velvety patches on the leaves, from which it spreads to the fruit. The fungus winters on the young wood just below the bark, producing blister-like swellings from which are liberated in the spring myriads of spores.

REMEDIES.—1. All blistered wood should be carefully pruned away in the winter. 2. The disease can be controlled by two sprayings with Bordeaux Mixture (see *SPRAYING MIXTURES*), or, in the case of more delicate varieties, with lime sulphur

(1 part lime sulphur to 30 parts water), (*a*) just before flowering, (*b*) immediately after flowering, and in bad cases a third spraying three weeks later will be found necessary.[1]

Bitter Pit.—This disease is characterised by a pitting of the apple on the outside and spots of brown, dead tissue in the flesh. The cause of the disease is still uncertain, though it is believed to be due to a disturbance of water supply.

REMEDY.—No cure is known.

Blossom Wilt (*Monilia cinerea*).—*Lord Derby*, *Cox's Orange Pippin*, and *James Grieve* specially suffer. The disease attacks the flowers, and a fortnight later the dead withered truss denotes its presence. The fungus travels down the spur and causes a canker in the branch, which it may encircle and kill. Grey pustules of the disease develop later on the spurs, and the spores from these infect the opening blossoms next spring.

REMEDIES.—The knife must be used. Cut off all affected spurs in summer whilst the dead leaves indicate the disease. When cutting care must be taken to cut back to sound wood. Spraying has so far proved useless.

Brown Rot (*Monilia fructigena*).—This begins as a brown spot in the flesh of the apple, often starting through a wound, or where the apple is in contact with a mummied apple of last year. The disease spreads rapidly through the fruit, rings of grey-brown pustules appear, consisting of myriads of spores. A similar disease attacks plums.

REMEDIES.—Diseased fruit and diseased wood should be collected and burned. It is most important also to collect all mummied fruits from the trees in winter, as it is from these that the disease largely starts in the sprng.

Water-Core of Apples is recognised by a peculiar glassiness or transparence about the core and sometimes extending to the surface or showing as transparent blotches. Water-core is caused by the tissues being over-charged with water due to atmospheric changes, or soil conditions.

REMEDIES.—Affected apples may partially recover if stored under conditions not too damp and cold.

A. D. C.

APPLE MILDEW.—See *APPLE DISEASES.*

APPLE MINT (*Mentha rotundifolia*).—See *MENTHA.*

APPLE ROSE (*Rosa pomifera*).—See *ROSE SPECIES.*

APPLE SAWFLY.—See *INSECT PESTS.*

APPLE SCAB.—See *APPLE DISEASES.*

APPLE SUCKER.—See *INSECT PESTS.*

APPLE WATER-CORE.—See under WATER-CORE in *APPLE DISEASES.*

APPLE WILLOW (*Salix triandra*).—See *TREES.*

APPLES : Culture of.—See *APPLE.*

APPLIANCES, GARDEN.—See *GARDEN APPLIANCES.*

APPLYING ARTIFICIALS.—See *WINTER GARDEN, THE ;* also *POTASH AND POTASSIUM COMPOUNDS*, and *SODA AND SODIUM COMPOUNDS.*

APPLYING CHALK.—See *SOIL IMPROVEMENT.*

APRICOT (*Prunus.* Nat. Ord. Rosaceæ).—**Culture of.**—This fruit being a native of hot Eastern countries requires a little care in our British climate. It is apt to gum and die back on walls, and should be grown there only on the spur system. Any pruning needed should be done while the trees are in growth, otherwise the wood will gum and the sap be impeded by the gum.

---

[1] *Cox's Orange Pippin* should never be sprayed with Bordeaux Mixture, but with weak lime sulphur (1 part to 60 parts water).

ming parts, in which case the growth above this dies out. The fact is that all needful growth is completed by August. Then the rains of September start the tree again, and the sappy growth gets cut by the frosts. To obviate this, cover the borders in September to throw off the rains, and remove covering in January. The trees may begin to flower at the end of February, and this bloom must be protected or much fruit will be lost. Thin freely where required, and when gathering the fruit it will be noticed that they are often found to be ripe on one side and hard on the non-exposed side. In that case lay them in the greenhouse, hard side to the sun, and they will then soon become fit for eating—perfect sweetmeats.

SELECTION OF SORTS.—*Grosse Pêche.* — The largest mid-season Apricot.

Kaisha.—Very small, deliciously sweet.

Large Early (Luizet).—Free bearer.

Moorpark.—The best all round kind.

Shipley or Blenheim.—Large and good.

Apricots should be grown as dwarf-trained on east or west walls; or on buildings in paved yards. On house walls, etc., grow them as standards.—G. B.

See also under *Prunus Armeniaca* in *TREES.*

APRICOT PLUM (*Prunus Simonii*).—See *TREES.*

AQUA FORTIS.—A popular name for NITRIC ACID, for which see *ACIDS: THEIR USES IN HORTICULTURE*

AQUILEGIA (COLUMBINE. Nat. Ord. Ranunculaceæ).—A hardy herbaceous perennial. Height, 1–3 ft. It succeeds in ordinary well-drained garden soil, and is propagated by seed and division of roots.

Culture.—Sow seed in March for flowering the following spring. Division of roots during the dormant season, autumn for preference, is another easy mode of propagation.

Beds of Aquilegias or bold clumps in the mixed borders make pleasing and dainty colour schemes for the early summer garden, blooming as they do in June and July.

Varieties.—The best sorts are hybrids of species such as *californica hybrida* and *caerulea hybrida*, and the long spurred hybrids from selected seed stocks such as Mrs Elliot, Dobbie's, Barr's, Sutton's, etc.—J. L. G.

AQUILEGIA: Rock Garden Species.

Five are suitable for the rock garden. These are dwarf in habit and mostly biennial. They thrive in deep loamy soil in half-shady positions, and are propagated by means of seeds sown in spring.

Aquilegia alpina.—Divided leaves in tufts. Flowers deep violet-blue, with long spurs. Site half-shade. Soil deep loam. Flowering Period, May to June. Height, 1 ft.

A. caerulea (ROCKY MOUNTAIN COLUMBINE).—Flowers pale blue and white, 3 ins. across with long spurs. Site half-shade. Soil deep loam. Flowering Period, May to July. Height, 1 ft.

A. canadensis.—Leaves finely divided in tufts. Flowers cinnabar-red and yellow. Flowering Period, April to June. Height, 1 ft.

A. glandulosa.—Flowers dark blue with white edges. Spurs short. Flowering Period, May to June. Height, 1 ft. *A. Stuartii* is a dwarf variety of this.

A. pyrenaica.—Very dwarf in habit. Flowers bluish-lilac, large. Flowering Period, April to June Height, 9 ins.

ARA KASI. (*Quercus glauca*).—See *TREES.*

ARAB'S DISS (*Festuca montana altissima*).—See *FESTUCA.*

ARABIS (Rock Cress. Nat. Ord. Cruciferæ).—This genus of rock garden plants, which have mostly small flowers, is useful as a carpeting subject for covering rocky ledges, etc. It is propagated by dividing the roots in autumn or spring, and may also be raised from seeds sown in gentle heat in March.

What to Grow.—Below we describe the best :—

Arabis albida (Wall Cress).—A spreading dwarf plant with hoary foliage. Flowers white, large. Site sunny. Soil sandy loam. Flowering Period, April to June. Height, 6 ins.

A. albida fl. pl. (Snowdrift).—A variety with attractive double white flowers.

A. androsacea.—A tufted alpine species with silvery leaves. Flowers white. Site sunny. Soil gritty. Flowering Period, June. Height, 3 ins.

A. Billardieri rosea.—Similar to *A. albida* in habit. Flowers pink. Site sunny. Soil sandy loam. Flowering Period, May to June. Height, 6 ins.

A. procurrens.—A free growing species with shining green leaves. Flowers white. Site sunny. Soil sandy. Flowering Period, May to June. Height, 6 ins. (There is a variety of this with variegated leaves.)

New Variety.

Arabis aubrietioides Trevor Seedling.—This has charming deep rose flowers.

ARACHMANTHE.—See *ORCHIDS.*

ARALIA.—For best species see *SHRUBS.*

ARAUCARIA.—For the best species see *TREES.*

ARBOR VITAE (*Libocedrus Sp. and Thuya Sp.*).—See *TREES.*

ARBOURS AND ARCHES.

The arbour in an old-world garden was, as its name suggests, a seat in a recess in a hedge or under a tree. Very delightful were those shady nooks roofed in with foliage, and their forms adapted to the spot chosen for the purpose. In many a modern garden, reproducing the gardens of other days, such arbours have been formed, and rustic seats provided under the greenery.

The term arbour has been given a wider meaning by modern folk, and is used synonymously with summer-house and more formal shelters, such as covered-in retreats of wood relieved by split rustic work on the plain surface. An arbour can also be made of open trellis-work and rustic wood, coloured and varnished to contrast with the greenery, which should be near by. The roof of such an arbour should be covered with some waterproof material, or, better still, thatched and made decorative with overhanging eaves. The arbour in a close-cut hedge can be half-round with a dome-shaped top, or merely an oblong structure with open front, the more elaborate summer-houses being closed in, with the exception of the doorway, and enriched with coloured glass panels. Octagonal or sexagonal shaped arbours are much favoured, and such structures add to the ornamentation of the garden.

The professional builder specialises upon such summer-houses and rustic shelters or arbours, and provides tables, seats, plant boxes, and other pieces of garden furniture, *en suite.* The amateur can, however, build many delightful arbours of varied forms, either of plain timber, open trellis, or rustic wood. Such structures are better self-coloured and varnished ; if necessary to paint them, however, garden green, not clashing with the surrounding foliage and colour schemes, is best ; many arbours are made more pleasing by partly covering them with roses, clematis, or similar climbing plants.

The Garden Arch can be made a thing of beauty and a useful trainer for roses and climbing plants. The common arch of iron wire is much favoured for a cheap trainer, so is the wood trellis arch, which may be made very attractive, and the wood arch, which can also be made a support for plants in pots by the insertion of brackets; such arches, too, may be made decorative by adding suspension baskets.

Artistic gardening is a delightful pursuit, and among the schemes introduced for assisting landscape gardening and effecting variety in the perspective, arbours and arches are recommended. As terminals to paths, or as breaks in a somewhat monotonous fence they are very desirable. They can always be used in conjunction with divisions over gates and at intervals along a fence; they are undoubtedly desirable accessories which can be purchased ready-made or built to any design by an amateur. The materials used and the forms in which such arches are built should always be in accord with other woodwork in the garden, as mentioned in our articles on *Garden Gates*, *Trellis Work*, etc.

F. W. B.

ARBOURS AND ARCHES FOR ROSES. See Roses for Arbours, Arches, and Pergolas in *Roses for All Purposes*.

ARBUTUS.—For the best species see *Shrubs*.

ARCHANGEL (*Archangelica officinalis*).—See *Archangelica*.

ARCHANGELICA (Nat. Ord. Umbelliferæ).—This is a small genus of hardy herbaceous perennials resembling *Angelica* (which see), and grown in the same manner. The two best species are *A. hirsuta*, bearing white flowers and growing 1–1½ ft. in height; and *A. officinalis* (Syn. *Angelica Archangelica*), used in confectionery, and popularly known as Archangel, bearing greenish-white flowers and growing 4–6 ft. in height. Both bloom in July, both are easily raised from seed, both are useful on account of their foliage in the wild garden or for shrub borders, and both are excellent town garden plants.

ARCH-BANE.—See Harmful Fungi in *Fungi: Edible and Harmful*.

ARCHES.—See *Arbours and Arches*.

ARCHES, ROSES FOR.—See Roses for Arbours, Arches, and Pergolas in *Roses for All Purposes*.

ARCHONTOPHŒNIX.—For the best species see *Palms*.

ARCTIA.—See Tiger Moth in *Insect Pests*.

ARCTIC CURLED KALE. — See *Borecole, or Kale*.

ARCTIUM (Burdock. Nat. Ord. Compositæ).—This is a genus of hardy herbaceous plants of no value whatever for garden purposes. They are troublesome weeds in some districts. One kind of Burdock (*A. Lappa*) is a very useful medicinal plant, and is described under its English name in our article on *Medicinal Herbs*.

See also under Burdock in *Medicinal Herbs*.

ARCTOSTAPHYLOS. — For the best species see *Shrubs*; see also under Bearberry in *Medicinal Herbs*.

AREAS OF BEDS AND BORDERS.—See *Arithmetic and Gardening*.

ARECA.—See under Chrysalidocarpus and Rhopalostyle in *Palms*.

AREMONIA.—Now included in the genus *Agrimonia*.

ARENARIA (Sandwort. Nat. Ord. Caryophyllaceæ).—This is a dwarf creeping or tufted plant, and a few of its species are suitable for the rock garden. It is propagated by dividing the roots in autumn or spring, and by seeds sown in gentle heat in March.

Rock Garden Species.—The most useful and desirable are described below :—

Arenaria balearica.—A moss-like plant, clinging to damp rocks, forming a deep green carpet. Flowers white in great profusion. Site half-shady, and shade. Soil rocky. Flowering Period, summer (June to August). Height, 1 in.

A. grandiflora.—A dwarf creeping plant with wiry stems, and narrow silvery-grey leaves. Flowers white. Site sunny. Soil sandy loam. Flowering Period, May to July. Height, 4 ins.

A. montana.—A dwarf creeping plant with wiry stems, and green leaves. Flowers white, large. Site half-shade. Soil sandy loam. Flowering Period, May to July. Height, 4 ins.

A. purpurascens.—A creeping plant, with wiry stems. Flowers reddish-purple. Site half-shade. Soil gritty. Flowering Period, May to July. Height, 3 ins.

A. tetraquetra.—This forms compact tufts of closely packed rosettes in the form of a mound. Flowers white. Site sunny. Soil gritty. Flowering Period, August. Height, 4 ins.

ARETIA.—Now included in the genus *ANDROSACE*.

ARISTELLA.—Now included in the genus *STIPA*.

ARISTOLOCHIA.—For the best species see *CLIMBING AND TRAILING PLANTS*.

ARITHMETIC AND GARDENING.

It often happens in connection with various gardening operations that simple arithmetical calculations have to be made. These calculations sometimes prove a stumbling-block to those whose schooldays are some distance behind them. It is therefore the object of this article to set forth clearly certain simple methods which it is hoped will prove useful. The strictest accuracy is not aimed at, especially as with the rough methods of measuring usually adopted, it would be unobtainable.

Arithmetical Constants.—The following list will be useful :—

(1) A cubic foot of water weighs 1000 oz.
(2) A cubic yard of water weighs ¾ ton.
(3) A pint of pure water weighs 1¼ lb.
(4) A gallon of water weighs 10 lb.
(5) A gallon occupies 277 cub. ins.
(6) About 6¼ gallons occupy 1 cub. ft.

A "table-book" will be useful for reference. The following facts are constantly wanted :—

12 ins. = 1 ft.
144 sq. ins. = 1 sq. ft.
1728 cub. ins. = 1 cub. ft.
5½ yds. = 1 pole.
30¼ sq. yds. = 1 sq. pole.
22 yds. = 1 chain
(the length of a cricket pitch).
10 sq. chains = 1 acre.
4840 sq. yds. = 1 acre.
8 pints = 1 gallon.
8 gallons = 1 bushel.
2240 lb. = 1 ton.
Standard brick = 9 × 4½ × 3 ins.

Areas of Beds and Borders.—Very often it is necessary to estimate the area of flower-beds of different shapes. The following notes will thus be useful :—

CIRCULAR BEDS : *Example.*—If o is the centre, the area is $3\frac{1}{7} \times oa \times oa$.

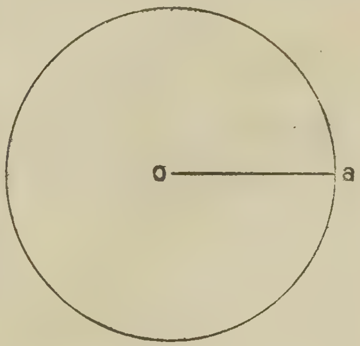


FIG. 1.

Thus if the radius oa is 10 ft., the area is $3\frac{1}{7} \times 10 \times 10$

$$= \frac{22}{7} \times 10 \times 10$$

$$= \frac{2200}{7}$$

$$= 315 \text{ sq. ft. nearly}$$

ELLIPSE-SHAPED BEDS: *Example.*—The Area $= 3\frac{1}{7} \times oa \times ob$.

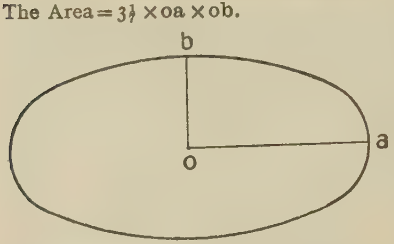


FIG. 2.

Thus if oa is 10 ft., and ob is 7 ft.

$$\text{Area} = \frac{22}{\cancel{7}} \times 10 \times \cancel{7} = 220 \text{ sq. ft.}$$

HEXAGONAL AND OCTAGONAL BEDS: *Example.*—The area of the hexagon abcdef is six times the triangle oed.[1]

So if de is 10 ft. and ok is 8 ft.

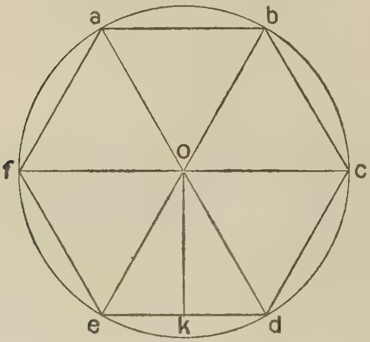


FIG. 3.

Area of hexagon $= 6 \times \frac{1}{2}\,(10 \times 8)$
,, $= 6 \times 40$
,, $= 240$ sq. ft.

The area of an octagon would be *eight* times the corresponding triangle.

RECTANGULAR BEDS: *Example.*—If ab is 10 ft., and bc is 7 ft., the area is $ab \times bc = 10 \times 7 = 70$ sq. ft.

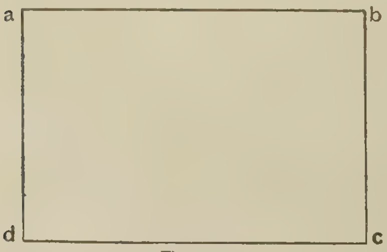


FIG. 4.

TRIANGULAR BEDS: *Example.*—If bc is 10 ft., and ad 6 ft., the area is $\frac{1}{2}(bc \times ad) = \frac{1}{2}(10 \times 6) = 30$ sq. ft.

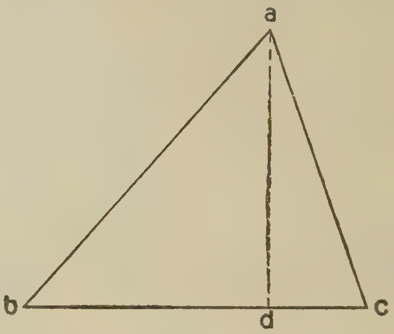


FIG. 5.

Percentages.—Suppose it is required to make up a mixture of 60 lb. of three different fertilisers A, B, and C, and that the mixture is to contain 30 per cent. of A, 25 per cent. of B, and 45 per cent. of C.

A must be $\frac{30}{100}$ of 60 lb.

B must be $\frac{25}{100}$ of 60 lb.

C must be $\frac{45}{100}$ of 60 lb.

So we must take $\frac{3}{10}$ of 60 or 18 lb. of A.
$\frac{1}{4}$ of 60 or 15 lb. of B.
$\frac{9}{20}$ of 60 or 27 lb. of C.

Another kind of percentage problem often arises in seed sowing. Suppose a certain kind of vegetable seed is known only to germinate up to 80 per cent. and 1000 plants are required, how many seeds must be sown?

In this 80 per cent. $= \frac{80}{100} = \frac{4}{5}$

$\therefore \frac{5}{4}$ of 1000 seeds must be sown.

$$= \frac{5}{\cancel{4}} \times \frac{\overset{250}{\cancel{1000}}}{1} = 1250 \text{ seeds.}$$

When the germination is only 50 per cent. and 1000 plants are required, it will, of course, be necessary to sow twice as many seeds as the plants wanted.

Thermometers.—To change from Centigrade to Fahrenheit double the

---

[1] For areas of triangles see later.—EDITOR.

Centigrade number, take off one-tenth, and add 32.

Example.—Express 25° C. in the Fahrenheit scale.

$$\begin{array}{ll} \text{Double } 25 & =50 \\ \text{Take off } \frac{1}{10} = & \underline{\ \ 5} \\ & \ \ 45 \\ \text{Add} & \ \ 32 \\ \text{Result} & \underline{\underline{\ \ 77}} \end{array}$$

Thus 25° C. = 77° F.

To change from Fahrenheit to Centigrade. Subtract 32, add one-ninth, and take half the result.

Example.—Express 100° F. in the Centigrade scale.

$$\begin{array}{ll} & 100 \\ \text{Subtract } 32 & \underline{\ \ 32} \\ & \ \ 68 \\ \text{Add } \frac{1}{9} & \underline{\ \ 7{\cdot}5} \\ & 75{\cdot}5 \\ \text{Take half} & 37{\cdot}7 \\ \text{Thus } 100^\circ \text{ F.} & = 37{\cdot}7^\circ \text{ C.} \end{array}$$

Unit Values.—These are used in calculating the cost of manures or fertilisers per ton. The current price per unit of nitrogen, soluble phosphate, insoluble phosphate, and potash can be obtained from the more technical newspapers dealing with advanced agriculture or with chemistry.

To estimate the cost per ton of a compound fertiliser, multiply the unit value of each of the four constituents above by the percentage present in each case, and the total of the four gives the cost.

Example.—Let the cost of a unit of each of the constituents be as follows: Nitrogen, 12s. 6d.; soluble phosphate, 1s. 6d.; insoluble phosphate, 1s.; and potash, 3s. 6d. Let the percentages of these four constituents be as follows: Nitrogen, 10 per cent.; soluble phosphate, 15 per cent.; insoluble phosphate, 20 per cent.; and potash, 5 per cent.

Then the total cost of the manure of fertiliser per ton is—

$$(12\tfrac{1}{2} \times 10) + (1\tfrac{1}{2} \times 15) + (1 \times 20) + (3\tfrac{1}{2} \times 5) \text{ s.}$$

$$= \left(\frac{25}{\cancel{2}} \times \overset{5}{\cancel{10}}\right) + \left(\frac{3}{2} \times 15\right) + 20 + \left(\frac{7}{2} \times 5\right) \text{ s.}$$

$$= 125 \quad + \quad 22\tfrac{1}{2} \quad + 20 \quad + \quad 17\tfrac{1}{2} \text{ s.}$$

$$= 185\text{s.} = £\frac{185}{20} = £9\ 5\text{s. per ton.}$$

The method of working is exactly the same where the percentages or unit values are more complex, or in the case of where one or other of the four constituents is absent.

Volumes.—This kind of calculation probably occurs more frequently than any other in gardening.

CAPACITY OF BARRELS.—Find the volume of a barrel 4 ft. high, whose average circumference is 8 ft., and radius 15 ins.

Here we use another rule for obtaining the area of a circle.

Area of circle = ½ circumference × radius.

Area of top of a similar cylindrical barrel—

$$= \tfrac{1}{2} \times 8 \times 1\tfrac{1}{4} \text{ sq. ft.}$$
$$= \quad 5 \quad \text{sq. ft.}$$

Volume of barrel = 4 × 5 = 20 cub. ft. approximately.

When the barrel bulges much, this rule will not be safe.

CAPACITY OF CYLINDER.—Find the area of the circular top and multiply by the height.

Example.—Find the volume of a circular hole 4 ft. in diameter and a yard deep.

The area of the circular top

$$= 3\tfrac{1}{7} \times 2 \times 2 \text{ sq. ft.}$$

The volume = $3\tfrac{1}{7} \times 2 \times 2 \times 3$ cub. ft.

$$= \frac{22}{7} \times 2 \times 2 \times 3 = \frac{264}{7} = 38 \text{ cub. ft. nearly.}$$

CAPACITY OF TANKS OR BOXES.—To find this measure the inside length, breadth, and height, and multiply these together.

Example (i.).—Find the volume of a tank whose inside measurements are 3 ft. 6 ins., 2 ft. 8 ins., and 4 ft. 9 ins.

The volume is—

$$(3\tfrac{1}{2} \times 2\tfrac{2}{3} \times 4\tfrac{3}{4}) \text{ cub. ft.}$$

$$= \frac{7}{\cancel{2}} \times \frac{\overset{\cancel{4}}{\cancel{8}}}{3} \times \frac{19}{\cancel{4}} \text{ cub. ft.}$$

$$= \frac{133}{3} = 44\tfrac{1}{3} \text{ cub. ft.}$$

Example (ii.).—How many gallons of water would the above tank hold?

As 6¼ gallons go to a cub. ft., the number of gallons is roughly—

$$6\tfrac{1}{4} \times 44, \text{ or } 275 \text{ gallons.}$$

Example (iii.).—What weight of water would fill the tank?

As a gallon weighs 10 lb., the weight is 2750 lb., or about 1¼ tons.

CUBICAL CONTENTS OF GREENHOUSES.—How many cubic feet of air are contained in a greenhouse whose length is 20 ft., and the end view of which is drawn on the next page?

Find the areas of the triangle abc and the rectangle bcde by the rules already given. Add these together, and multiply by the length—in this case 20 ft.

Thus if abc is	100 sq. ft.
and bcde is	250 sq. ft.,

there are 350 × 20 or 7000 cub. ft. of air in the greenhouse. The directions furnished with fumigating compounds are usually per 1000 cub. ft., and unless a proper calculation such as the above is made the plants may be severely injured by an overdose of the smoke.

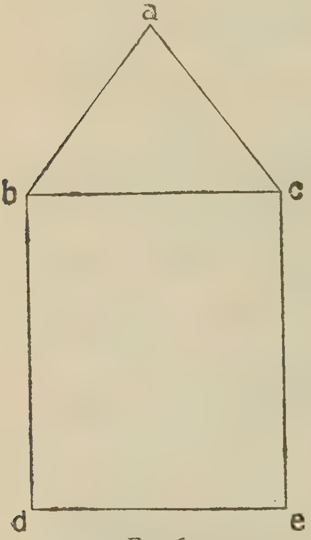


Fig. 6.

Gravel for Paths.—What amount of gravel will be required for a layer 3 ins. thick on a path 50 yds. long and 1½ yd. wide?

The volume required will be—

$$(150 \times 4\tfrac{1}{2} \times \tfrac{1}{4}) \text{ cub. ft.,}$$

$$= \frac{\overset{75}{\cancel{150}}}{1} \times \frac{9}{\cancel{2}} \times \tfrac{1}{4} \text{ cub. ft.}$$

$$= \frac{675}{4} = 169 \text{ cub. ft. nearly.}$$

Taking the volume of a ton of gravel as 20 cub. ft. we shall want $\frac{169}{20}$ or about 8½ tons.

Plants required for Different Areas.—How many plants will be required for a bed 10 ft. × 12 ft., if they are planted 6 ins. apart?

It will evidently be possible to put 23 plants along dc, supposing each plant to be 6 ins., from the edge, and 19 along ad.

Thus the number required is

23 × 19, or 437 plants.

Soil for Borders.—How many tons of soil will be required to fill a border 20 yds. by 10 ft., and 1 ft. deep?

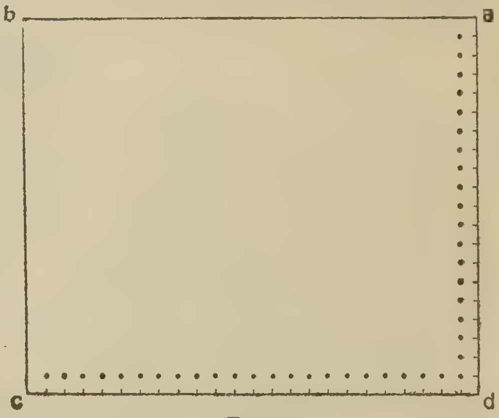


Fig. 7.

The volume of the bed is 60 × 10 × 1 = 600 cub. ft.

Taking the volume of a ton of soil as 24 cub. ft., we shall want $\frac{600}{24}$, or 25 tons.

Wall Building.—How many tons of bricks will be required to build a single (4½ ins.) wall 5 ft. high, and 50 ft. long?

If abcd represents the bottom layer, and dm represents a brick, we shall want $\frac{50 \times 12}{9} = \frac{50 \times \overset{4}{\cancel{12}}}{\underset{3}{\cancel{9}}} = \frac{200}{3}$ or about 67 bricks for this layer.

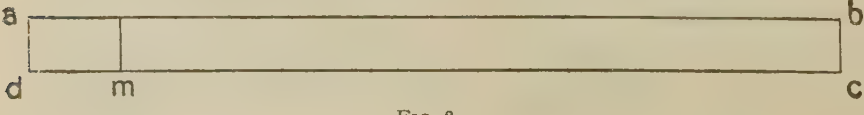


Fig. 8.

The number of layers will be $\frac{5\text{ ft.}}{3\text{ ins.}} = 20$.

Therefore 67 × 20 or 1340 bricks will be wanted.

Taking the weight of a brick as 8 lb., the total weight required will be

$$\frac{1340\times 8}{2240} = \frac{\overset{67}{\cancel{1340}}\times\cancel{8}}{\underset{\underset{14}{\cancel{28}}}{\cancel{2240}}} = \frac{67}{14}\text{ tons,}$$

or roughly 5 tons, with some allowance for wastage.

Weight of Bushel.—A useful method of finding the weight of a bushel of anything is to weigh a pint of the substance as accurately as possible, and then multiply by 64.

S. B. L. & E. T. E.

ARIZONA CEDAR (*Cupressus Benthami arizonica*).—See *TREES*.

ARMERIA (CUSHION PINK, SEA PINK, and THRIFT. Nat. Ord. Plumbaginaceæ).—This is a genus of evergreen tufted plants, one or two of the dwarfer kinds being excellent rock garden subjects. To propagate divide the roots in the spring.

Armeria alpina.—This is a robust species. Flowers purple. Site sunny. Soil rocky. Flowering Period, July to August. Height, 6 ins.

A. caespitosa.—This is the smallest species, with bluish-grey leaves in compact tufts. Flowers pale lilac in large heads. Site sunny. Soil rocky. Flowering Period, May and June. Height, 2 ins.

A. latifolia (Syn. *A. Cephalotes* and *A. mauritanica*).—This bears broad leaves in loose tufts. Flowers rosy-lilac and other colours in large heads. Site open. Soil deep loam. Flowering Period, May to July. Height, 1 ft.

A. maritima (Syn. *A. vulgaris*).—This is the COMMON THRIFT. Flowers pink, white, crimson, or purplish above grass-like foliage. Site sunny. Soil ordinary. Flowering Period, May and June. Height, 4 ins.

A. mauritanica.—A synonym of *A. latifolia*, which see.

A. plantaginea.—This has plantain-like leaves. Flowers rose-pink and many other colours, in large heads. Site open and sunny. Soil deep loam. Flowering Period, May to July. Height, 1 ft.

A. vulgaris.—A synonym for *A. maritima*, which see.

[There are a number of other species of this genus grown at Kew and in gardens where space is no object. The above selection includes only the cream of the species.—EDITOR.]

ARMORACIA.—Now included in the genus COCHLEARIA.

ARNEBIA (Nat. Ord. Boraginaceæ). Everyone familiar with the beauty of *Macrotomia echioides* (see *MACROTOMIA*), perhaps better known as *Arnebia echioides*, will appreciate the charms of the allied but annual *A. cornuta* and *A. Griffithii*. The first may reach a height of 1½ ft., from an April sowing out of doors, though March sowing in a frame generally gives better results. The flowers are yellow, with a black spot on each petal. *A. Griffithii*, with rich yellow flowers, grows 9 ins. high. Both bloom from June onwards.

See also *MACROTOMIA*.

ARNICA (LAMB'S SKIN. Nat. Ord. Compositæ).—Although there are many species in this genus, only one is usually considered worth growing, and is a rock plant. This (*Arnica montana*) requires well-drained gritty loam in full sun. It is propagated by dividing the roots in the spring or by seeds sown in gentle heat in March which come up freely. The flowers produced on branching stems are orange-yellow and are given in May, June, and July. The height is about 1 ft.

ARONICUM.—Now included in the genus *DORONICUM*.

ARPOPHYLLUM.—See *ORCHIDS*.

ARRANGEMENT OF ORCHARD TREES.—See *ORCHARD: MAKING AND MANAGEMENT OF.*

ARRANGEMENT OF PLANTS.—See *HERBACEOUS BORDERS: MAKING NEW.*

ARRANGEMENT OF SCHOOL GARDEN.—See *SCHOOL GARDENING.*

ARROW-GRASS (*Triglochin.* Nat. Ord. Naiadaceæ).—This is a small genus of hardy grasses succeeding in marshy land. Two forms are usually grown, the SEA ARROW-GRASS (*T. maritimum*) and the MARSH ARROW-GRASS (*T. palustre*). Both average about 12 ins. in height.

ARROW-GRASS, MARSH. — See *ARROW-GRASS.*

ARROW-GRASS, SEA.—See *ARROW-GRASS.*

ARROW-HEAD.—See *WATER GARDEN: PLANTS FOR THE,* and *SAGITTARIA.*

ARROW-WOOD (*Viburnum dentatum*). See *SHRUBS.*

ARSENATE OF LEAD.—See *INSECT PESTS: GENERAL METHODS OF DESTRUCTION.*

ARTEMISIA (LAD'S LOVE, OLD MAN, SOUTHERNWOOD, TARRAGON, WORMWOOD, etc. Nat. Ord. Compositæ).—Some species of this genus are described elsewhere in this Dictionary under their English names in the articles on *MEDICINAL HERBS* and *POTHERBS.* They are not largely used in gardens except as herbs, but may be set in the perennial border, rock garden, or wild garden. They succeed in common light rich garden soil in any open position and have pleasingly scented foliage. There are some half-hardy or greenhouse sorts which we need not trouble to notice here.

Perennial Border Species. — A very large number have been described, of which the following is a selection. All may be propagated by root division in the autumn or spring, or by seeds sown in the usual way.

Artemesia argentea. — A useful yellow or white species blooming from June onwards, and about 2 ft. high.

A. austriaca.—A sort with brownish flowers blooming in September, and about 18 ins. high.

A. cana.—A yellow sort blooming in July and August. Average height, 30 ins.

A. lactiflora.—This is probably the most popular sort. Its flowers are white, the foliage is fine, and the plant blooms freely in September and October. Its height is 2–4 ft.

A. pontica.—A yellow September blooming sort averaging a yard in height.

Rock Garden Species. — Three only are valuable for the rock garden, and these may be grown in rock crevices as foliage plants. They are propagated by cuttings in July.

Artemisia Baumgarteni. — This has silvery much divided leaves in tufts on sub-shrubby stems. Flowers yellowish. Site warm, well drained. Soil gritty. Flowering Period, July. Height, 6 ins.

A. lanata.—The leaves of this are softly woolly and silvery, on sub-shrubby prostrate stems. Flowers dull white. Site a warm rock crevice. Soil gritty. Flowering Period, July. Height, 6 ins.

A. vallesiaca.—This has much divided and silvery-white leaves on erect branching stems. Flowers dull white. Site sunny. Soil gritty, well-drained. Flowering Period, June to July. Height, 12 ins.

See *SHRUBS,* and under MUGWORT, SOUTHERNWOOD, and WORMWOOD in *MEDICINAL HERBS.*

ARTHROLOBIUM.—Now included in the genus *ORNITHOPUS.*

ARTICHOKE, CHINESE. — See *CHINESE ARTICHOKE.*

ARTICHOKES (Syn. SUNROOT. Nat. Ord. Compositæ).—Three distinct kinds of these are cultivated in this country, the Chinese (*Stachys Sieboldi*) — for which see separate article—the Globe (*Cynara Scolymus*), and the Jerusalem (*Helianthus tuberosus*). The first mentioned finds little favour among those owning small gardens, but where there is plenty of room, and variety in vegetables is appreciated, it is usually given a place.

Globe Artichokes (*Cynara Scolymus*) are cultivated for their large edible heads; these are in season throughout the summer and early autumn, and by many regarded as a great delicacy. The plant, which is of handsome appearance, is not really hardy, and, especially where the soil is wet or badly drained, protection should be given at the approach of severe weather.

Propagation is effected by seeds, or offshoots, the former being sown in heat early in March, or later in the open garden. Planting out should be done when sufficiently hardy, or large enough to handle. Give a well-manured soil, allowing from 30 to 36 ins. between the plants, and not less than 5 ft. between the rows. No heads should be allowed to develop the first season. Offshoots may be planted in early spring, giving copious waterings throughout the summer.

Jerusalem Artichokes (*Helianthus tuberosus*) are by far the most popular, and succeed well in almost any district. On heavy ground the tubers although produced in abundance are usually of very irregular shape, this being less apparent when plenty of ashes or road-sand is added before planting. Where the soil is of a sandy nature the shape of these is more even and the table quality is better. Planting may be done any time from January to the end of March. Set the tubers 18 ins. apart, in rows 2 ft. asunder. The crop may be lifted in November, or left in the ground to be dug as required for use.

Two distinct varieties are now in general cultivation, the old purple skinned, and the newer Sutton's White. This latter is far and away the better of the two, and is recommended for all soils.—F. R. C.

See also *CYNARA*.

ARTIFICIAL FENCES.— See *GARDEN FENCES*.

ARTIFICIAL FERTILISERS: Their Use in the Garden.—The term artificial manure is usually meant to include any manure that is prepared by some manufacturing process (such as is carried out in the case of superphosphate). This distinction is unfortunately not as definite as might be desired; for instance, guano is merely dried dung, and yet is always referred to as an artificial. A further distinction between artificial and natural manures may be borrowed from the realm of chemistry. It is known that chemical infertility of a soil is usually due to deficiency in one or more of the most readily exhausted ingredients of the soil necessary for plant food, namely, Nitrogen (in compound form), Phosphates, or Potash. Artificial manures are usually applied for the purpose of supplying the deficiency of one or two of these ingredients; the needs of a soil deficient in all three substances that make for fertility are best met by an application of a natural manure.

Storage of Artificials.—If any fertiliser is to be used with the greatest success it must be properly stored or it may lose much of its value. Natural manures such as dung may greatly improve by being stored, but this is never true in the case of artificials. They must be carefully stored in a perfectly dry place, preferably with a concrete floor if a satisfactory texture and chemical composition are to be preserved. Even when stored under the best conditions they may become lumpy and have to be crushed or sieved before application. Manures most liable to spoil when stored are :—Dissolved Bones, Nitrate of Ammonia, Nitre Cake, Nitrate of Lime, Nitrolim (or Calcium Cyanamide), Superphosphate, and the higher grades of guano.

What Not to Mix.—To lessen the work of applying artificials they are often mixed, but there is usually a risk of loss if the components of the mixture react upon one another. Before mixing any artificials the following rules should be learnt :—

Firstly, Acid manures, such as Superphosphate of Lime or Dissolved Bones, should not be mixed with nitrates, since one spoils the other.

Secondly, Lime, or other manures containing lime, such as Basic Slag, should not be mixed with Sulphate of Ammonia or any organic manure that may contain ammonia, for a similar reason.

Thirdly, Superphosphate of Lime should not be mixed with Basic Slag or any other manure containing insoluble phosphates, for if it is the plants will less readily take up the phosphate contained in the former.

Kainit and Nitrate of Soda should not be mixed, as the product will set hard. Any other artificials not mentioned above may be safely mixed.

When to Apply.—The time of application greatly influences the effects of any artificial manure; quick acting manures such as Nitrate of Ammonia, Nitrate of Lime, Nitrate of Potash, Nitrate of Soda, Phosphate of Ammonia, Phosphate of Potash, etc., are best applied to growing crops, and if the land is dressed with them before planting much of their value is lost. Sulphate of Ammonia may be satisfactorily applied at the time of sowing seeds or planting tubers and sets, since it undergoes a process of nitrification in the soil before it is made use of by the plant. Salt, however, should not be applied at sowing time as it is apt to injure tiny seedlings.

Basic Slag is usually applied in the autumn for the succeeding crop, and the same remark applies to Gaslime, which in the fresh state contains substances poisonous to plants. By applying the latter to the land in the autumn, the action of the air renders these substances harmless before the growing season comes on. Kainit also is more suitable for autumn and winter application on heavy or limestone soils, but on light soils (which are most benefited by this fertiliser) should be applied in the early spring. Granulated Nitrolim should also be put on in the winter or early spring to give it time to lose the power, possessed by some samples, of injuring growing crops.

When fertilisers are applied to growing crops, care is necessary in the case of dusty compounds such as ground Nitrolim and Nitrate of Ammonia, which have a scorching action on the foliage and which may in the case of broad-leaved plants easily kill them entirely.

As the usual object for which artificial manures are applied is the benefiting of the immediately succeeding crop, the majority are spring sown. There is no objection, however, to applications at other seasons of the year except in so far as rapid-acting manures are concerned, and these are readily determinable by the fact of their containing readily soluble chemical substances, the amounts of which can be immediately ascertained by reference to the chemical analysis which the purchaser has always the right to claim from the vendor.

Fertilisers for Various Soils.—Certain artificials are specially suited to certain classes of soils. We give details of the best for the two chief classes of soil below:—

ARTIFICIALS FOR HEAVY SOILS.—Nitrate of Soda is especially suited for clay land which contains a sufficiency of potash, and this the dressing of Nitrate of Soda helps to bring into use.

Basic Slag gives pronounced results on heavy land, while on light land is often without apparent effect.

Wool Waste and other artificials of a bulky nature are particularly valuable for improving the texture of heavy land.

ARTIFICIALS FOR LIGHT SOILS.—Kainit and other potash manures (such as Carnallite, Muriate of Potash) are particularly valuable on light soils.

Wood Ashes are of more value to

TABLE OF ARTIFICIAL FERTILISERS.

NAME OF FERTILISER.	AMOUNT TO APPLY DRY (Per 30¼ sq. yards).	AMOUNT TO USE WET (Per gallon of water, per 30¼ sq. yards).
Basic Slag.	7½–15 lb.	Not soluble, so not used.
Bone Meal.	4 – 8 lb.	Not soluble, so not used.
Chalk.	30 –90 lb.	Not soluble, so not used.
Chloride or Muriate of Potash.*	2 – 4 lb.	Not used.
Chloride of Soda (Salt).$*_2$	2 lb.	Not used.
Cyanamide.	1 – 2 lb.	Not used.
Dissolved Bones.	4 – 8 lb.	1½ oz. per gal., 40–80 gals.
Guano.	4 lb.	½ peck per 36 gals.
Horn and Hoof Refuse.	20 lb.	Not soluble, so not used.
Kainit.*	4 lb.	Not used.
Lime (Quicklime).	1 – 3 lb.	As much as will dissolve.
Nitrate of Ammonia.	7½– 9 oz.	½ oz. per gal., 15–18 gals.
Nitrate of Potash.*	1 lb.	¾ oz. per gal., 21 gals.
Nitrate of Soda.$*_1$	1 – 2 lb.	¾ oz. per gal., 21–40 gals.
Nitrolim.	2 lb.	Not used.
Phosphate of Ammonia.	Only used in solution.	¼–½ oz. per gal., 10–20 gals.
Phosphate of Lime.	See Bone Meal.	Not soluble, so not used.
Phosphate of Potash.	Only used in solution.	¼–½ oz. per gal., 10–20 gals.
Phosphate of Soda.	Only used in solution	¼–½ oz per gal., 10–20 gals.
Refuse from Carbide.	15 lb.	Not used.
Salt.$*_2$	2 lb.	Not used.
Soot.	Sufficient to colour ground black.	1 peck to 40 gals., 40 gals.
Sulphate of Ammonia.	1½ lb.	1 oz. per gal., 24 gals.
Sulphate of Lime (Gypsum).	12 –15 lb.	Not used
Sulphate of Potash.*	2 – 4 lb.	½–¾ oz. per gal , 60–80 gals.
Superphosphate.	4 – 6 lb.	1 oz. per gal., 60–70 gals.
Wood Ashes.	15 –20 lb.	Not used.
Wool Waste.$*_3$	10 lb.	Not soluble, so not used.

In the above table the suitability of fertilisers to particular crops is denoted as follows:—

* For Asparagus, Carrots, Cauliflowers, Globe Artichokes, Onions, and Parsnips.

$*_1$ For Spinach and Green Peas improved in cooking qualities.

$*_2$ For Beet and Sugar Beet.

$*_3$ For Hazel Nuts, Damsons, Hops.

light land than heavy land—the latter being less deficient in potash.

Superphosphate is a better artificial than Basic Slag for the addition of phosphate to light land. Bone Meal and Dissolved Bones are also suitable.

What to Avoid.—Applications of artificials that may be expected to give unsatisfactory results are:—

Sulphate of Ammonia applied to a soil deficient in Lime.

Superphosphate of Lime applied to a sour soil, particularly if the crop to be grown is susceptible to an acid condition of soil. (Turnips and Cabbages, for instance, are very liable to become "clubbed" when so treated.)

For gardening practice in the use of artificial fertilisers it is useful to remember that a dressing of 1 oz. per square yard represents a dressing of about 2½ cwt. per acre.

We give on p. 63 a table of Artificial Fertilisers in which brief details are set out as to their mode of application.—P. H. F.

[Further hints on the use of artificials will be found in our articles *Lime Compounds*, *Potash and Potassium Compounds*, *Soda and Sodium Compounds*, etc.—Editor.]

ARTIFICIAL FLAGSTONES.

Flagstones are costly and often very difficult to get, but are so useful for hearths, etc., in greenhouses that they are practically indispensable to gardeners. Where natural stone is not available they can be easily made as follows:—

Have ready a large wooden seed-box of the size the stone is required and line it carefully with a double thickness of newspaper. Fill the box with concrete (see article on *Mortar*), to within an inch of the top, taking care that the corners are not left "hollow," and smooth the surface with a mortar trowel, pressing loose stones into the body of the mixture. Pour off any excess of water which may rise to the surface and put on a layer half an inch thick of Cement for Facing (see article on *Mortar*), smoothing this well out. Allow to set for about a week, then turn the box over and give its bottom a few knocks with a hammer and the flag will drop out. After drying for a day or two longer it is ready for laying.

ARTIFICIAL MANURES FOR VEGETABLES.—See *Vegetables: General Considerations*, and under Food for All Crops in *Feeding Plants*.

ARTIFICIAL STONE. — See Rock-work.

ARTIFICIALS FOR HEAVY AND LIGHT SOILS. — See under Fertilisers for Various Soils, in under *Artificial Fertilisers*.

ARUM LILY. — A name applied to *Richardia africana*. See *Arum Lilies*.

ARUM LILIES (*Richardia*, Nat. Ord. Araceæ).—These are greenhouse perennials with fleshy root-stocks, and either white or yellow flowers. The decorative part of the so-called flower is really a spathe, the true flowers being borne on the central part or spadix.

Culture.—They like a rich soil, hence when potting the mixture of loam and sand should be enriched with good old cow manure and some bone meal. The dry rhizomes are best obtained in August or September, when they should be at once potted in good large pots. Three crowns may be put in an 8- or 9-inch, or one in a 6-inch, pot. Stimulants should be applied whenever the pots have become full of roots. The winter temperature under glass should not fall below 45° F. In summer, that is, when all danger from frost is over, the pots may be plunged in the open air, or the plants turned out into a border, where they may remain until they are repotted in early September preparatory to their being again housed. During the time the plants are outside, they need copious supplies of water and regular feeding with stimulants, care being taken, if proprietary articles are used, to apply only as directed on the bag or tin.

In the southern parts of the British Isles, the Arum Lily (*Richardia africana*) is sometimes planted in shallow water from 1 to 2 ft. deep round the edges of lakes and pools, and is wonderfully effective when it really flourishes in such positions.

The yellow-flowered species require more heat in the winter than the old white varieties. They must be kept under glass all the year round. These (yellow-flowered) species and varieties may be repotted in February when they are beginning to grow, after their period of almost dryness from October to the end of January, when they are quiescent. Water must be given very sparingly indeed, if at all, during this period. The temperature should be about 60° F. when they are growing.

Species and Varieties :—*Richardia africana* (the old *Calla æthiopica*).—This is the well-known Arum Lily, so much used in floral decorations and wreaths. The spathe is large and white. Care must be taken to fumigate whenever there is any sign of greenfly, or the pure whiteness of the spathe will be sullied. Seminal varieties have of late appeared. Of these *Little Gem* is hardly half the size of the type. *Childsiana, Pearl of Stuttgart,* and *The Godfrey* are useful. The last claims to be extra free. *Nicolai* is a tall grower, with extra large flowers. All these average 2–3 ft. in height.

R. elliottiana (GOLDEN CALLA).—This has large yellow flowers and spotted foliage. It blooms about August and grows 2 ft. high. Hybrids of this are now in commerce, of which *Mrs Roosevelt* (pale yellow) is one of the best.

R. Pentlandii has large yellow flowers and unspotted leaves. It is summer flowering, and grows 2 ft. high.—J. J. & E. T. E.

ARUNCUS.—Now included in the genus *SPIRAEA*.

ARUNDINARIA.—See *BAMBOOS*.

ARUNDO (REED. Nat. Ord. Gramineæ).—This is a genus of plants of no great garden value. *A. Donax,* the PROVENCE REED, is sometimes grown in the wild garden, shrub border, or water garden, under the impression that it is the PAMPAS GRASS (see notes on *CORTADERIA* and *ORNAMENTAL GRASSES*). It flowers much more freely than the last named, though not nearly so elegant, and grows 9–12 ft. in height.

ASAGARA (*Halesia hispida*).— See *SHRUBS*.

ASARINA. — Now included in the genus *ANTIRRHINUM*.

ASCLEPIAS (MILKWEED. Nat. Ord. Asclepiaceæ).—This genus, though a large one, is very little known save to students of hardy herbaceous plants, or those who make a direct speciality of their culture. Some are not hardy, but these we are not dealing with here. The rest are useful, hardy, ornamental plants, though the nomenclature of the species is somewhat confused. They may be used in the border, but the site should be warm and sunny and some winter protection given. Regarding the soil, I am informed they do best in a peaty medium, but, personally, I do not think this is essential. To propagate them, sow seed in the usual way at the usual times for perennials. They may also be increased by division of the roots in the spring, and may be planted any time from November to the end of March.

What to Grow.—Species are numerous. We recommend any of the following:—

Asclepias amplexicaulis.—A desirable red sort blooming during July, and averaging 2 ft. in height.

A. Douglasii (Syn. *A. speciosa*).—A useful red sort, blooming in September and October, which averages about 24 ins. in height.

A. incarnata.—A reddish-purple sort of no great value, blooming from July onwards, and of similar height to the above.

A. Michauxii.—A useful white sort, blooming at the same time as the last-named, but a little taller.

A. obtusifolia.—This purplish sort is not as pretty as some. It blooms in July and averages about a yard high.

A. phytolaccoides.—Similar to the above.

A. polystachia.—A taller white flowering sort, coming in during July, and averaging 36–42 ins. in height.

A. quadrifolia.—A useful sort with a scent. In colour it may be light purple, reddish, or nearly pure white. It blooms at the same time as the above, but rarely exceeds 15 ins. in height.

A. rosea.—This is a red sort coming in during July. Its height averages about 12 ins.

A. rubra.—Similar to *A. rosea.*

A. syriaca.—Another scented sort bearing purplish flowers in July. Its height varies from 2½–4½ ft.

A. tuberosa.—An attractive tuberous species bearing distinctly good orange flowers during the summer and in September. Its height averages 18–24 ins.

A. variegata.—A purple-white variety not as attractive as the above opening in July, varying from 2½ to 3½ ft. in height.

ASCOMYCETES.—A group of FUNGI. See *FUNGOUS DISEASES.*

ASH.—A name applied to the genus FRAXINUS. See *TREES.*

ASHES OF PLANTS, Analysis of. It used to be the custom to analyse the ashes of crops and supply to the ground, in the form of artificial manures, those chemicals contained in the ashes of the crops. This old-fashioned idea is now fortunately expiring, for chemical research has proved it to be of very little value.

To take an example: The ash of the stem of the Jerusalem artichoke was analysed and found to contain silica. It was assumed, taking the premises above, that if the ash contained much silica the plants would be greatly benefited by an application of soluble silica. Now silica is not easy to obtain in a soluble state, the best known compounds being hydrofluor-silicic acid,—a compound no amateur should handle,—silicic acid, and sodium and potassium silicate. Some sodium silicate was applied to certain artichokes, and some silicic acid to others. But the most careful observation failed to show any difference in size, quality, or bearing capability between the plants dressed with silica and the plants not dressed with it. Countless other examples might be named to show that the ash contents have little to do with the requirements of the plants.

A much better way to find out what our plants need on certain soils is to have the soil analysed, and then conduct experiments with the crops on the land, using various artificial fertilisers. This takes time but is a most interesting and useful work.

Further notes on Experiments will be found in the article *GARDEN EXPERIMENTS.* Every gardener should, we think, make an effort to conduct at least one simple experiment each year.

ASHES: Their Value in the Garden. Gardeners divide ashes into two groups, wood ashes and furnace ashes. The first group includes all the ashes gained by burning woody garden rubbish, as well as that gained by burning such green material as potato tops, weeds, ivy leaves, etc. These ashes are most valuable for the garden; they can either be used when digging or trenching in the winter at the rate of a pound per cubic yard of soil; or when sowing such root-crops as parsnips, carrots, long beetroot, etc., at the rate of 4 oz. per sq. yd. of surface soil. In every case they should be got under cover as soon as they are produced; if rain falls on them most of the potash they contain is washed out of them, and they are then valueless for crops.

The second group, furnace ashes, includes coal ashes, as well as the ashes produced in coke-burning furnaces. Some people favour the use of these for lightening heavy clay soils; they may be good for mechanically improving the worst clays; but we prefer to keep them off the garden soil. The coke or cinder grit they invariably contain does the crops little good, and in some cases scabs on potatoes have been traced to ashes. Ashes, if used at all freely, also make the soil much too porous, with the result that crops become dry very easily in summer and much labour for watering is required.

Furnace ashes are, however, decidedly useful for making rough paths in the garden. But ash paths, since they "pick up" in bad weather, must not be made too freely in the garden.

Furnace ashes form also a very useful medium in which to plunge pot-plants in the summer, since they effectually prevent worms from entering the pots. For this purpose they should be put through a ½-inch riddle to remove clinkers, etc.

See also under POTASH MANURES in *MANURES*.

ASPARAGUS (*Asparagus officinalis*. Nat. Ord. Liliaceæ).—Few crops better repay a good rich soil than this, a fact which needs to be kept in mind by all when first forming new beds.

The old system of raised beds is now recognised as being superfluous, excepting where the soil is of a very retentive nature, in which case plenty of old builders' rubbish, or clinkers, should be buried not less than 3 ft., below the surface of the bed. The width of the bed is usually from 3 to 4 ft., and when preparing new sites, manure from well-fed horses or cows should be aimed at. A good dressing of old mortar is an advantage to most soils at the time of preparation. Start work as early in the winter as circumstances allow, but defer planting till early spring.

A bed 3 ft. wide will take two rows of plants, allowing each to be a foot from the outer margin. A bed 4 ft. wide will take an extra row, but such a bed will require plenty of help in the shape of rich top-dressings if the produce is to be of the highest quality. Set each plant about 12 or 18 ins. from its neighbour, the distance being decided by the age and size of the plant, also the richness of the bed, a poorly made bed needing more plants. Bury the crowns 3 ins. deep.

No cutting should be attempted the first year, and only very little the second year after planting. Give plenty of clear water if a dry period follows the planting, and keep the bed free from weeds. The second year, instead of clear water, use liquid manure very freely from May until the end of August. Abundance of excellent asparagus should then be forthcoming during April, May, and early June of the third year from time of planting if one or two year old crowns are set. Cutting should cease after the middle of June, at which date a heavy dressing of rich manure should be given, and manure-water or other liquid fertiliser given liberally during the following ten months. If this is done, the one-time popular method of applying manures in early spring may be dispensed with, though a good dressing of common salt, or Nitrate of Soda in March (3 oz. to the square yard), will be an advantage. Cut away all foliage early in November.

If it is preferred to raise the plants at home, sow the seed in single pots, or in the open air in March, setting each seedling 9–12 ins. apart. Such plants may be transferred to permanent beds the following year.—F. R. C.

See also under *ORNAMENTAL VEGETABLES*. For METHOD OF BOTTLING see *VEGETABLE BOTTLING*.

ASPARAGUS BEETLE.—See *INSECT PESTS*.

ASPARAGUS FERN.—See *ASPARAGUS PLUMOSUS*.

ASPARAGUS FLY. — See *INSECT PESTS*.

ASPARAGUS KALE.—See *BORECOLE, or KALE*.

ASPARAGUS PLUMOSUS (ASPARAGUS FERN. Nat. Ord. Liliaceæ).—This is one of the best and most useful plants either in pots or planted against a wall as a decorative plant, or for cutting purposes, and will keep fresh in water for a long time after being cut. It is propagated by division or seeds in spring, in good turfy loam, leaf-mould and sand, and succeeds well in a temperature between 45° and 60° F.

Greenhouse Species.—*Asparagus myriocladus.*—Whitish-green. Long erect feathery fronds. Flowers from June to September. Height, 1½–3 ft.

A. plumosus (ASPARAGUS FERN). —White. Flowers from May to September. Height, 1–1½ ft.

A. p. scandens.—White. A trailing plant for walls. Flowers from May to September. Height, 2–10 ft.

A. Sprengeri. — Whitish-green. Suitable for hanging baskets. Flowers from June to September. Height, 1–6 ft.

A. tenuissimus. — Light green. Suitable for trailing or for pots. Flowers from May to September. Height, 1–6 ft.

ASPARAGUS RUST. — See *DISEASES OF PLANTS*.

ASPECT FOR ORCHARDS.—See *ORCHARD: MAKING AND MANAGEMENT OF*.

ASPECTS FOR WALL TREES.—See *FRUIT CULTURE: HARDY*.

ASPEN (*Populus tremula*).—See *TREES*.

ASPERUGO (GERMAN MADWORT. Nat. Ord. Boraginaceæ).—This is a genus of hardy annuals of no value in the garden. The best-known sort is *A. procumbens*, or GREAT GOOSE-GRASS, a troublesome weed in some districts. This must be carefully distinguished from ordinary GOOSE-GRASS (*Galium Aparine*), a much more common annual described in our article on *WEEDS*.

ASPERULA (WOODRUFF. Nat. Ord. Rubiaceæ).—One species of this is a hardy annual, and this is the Syrian *Asperula orientalis* (Syn. *A. azurea*). It grows about 1 ft. high, and its slender stems are furnished with small green leaves in whorls of eight. The small light blue flowers are abundantly produced, and they have the additional virtues of fragrance and longevity when cut and placed in water. It is easily grown in ordinary garden soil from seeds sown thinly in March or April. It is a charming plant, but not nearly so well known as it deserves to be.

Rock Garden Species. — Three species of this genus may be selected for the rock garden, the others are too aggressive. Propagate by dividing the roots in autumn or spring.

Asperula hirta.—Leaves in whorls of six, closely set on wiry stems. Flowers white, changing to pink. Site sunny. Soil gritty. Flowering Period, June to September. Height, 4 ins.

A. nitida (Syn. *A. Gussoni*).—Leaves in whorls on short stems forming dense cushions of dark green. Flowers white. Site sunny. Soil gritty. Flowering Period, June to July. Height, 2 ins.

A. suberosa (Syns. *A. Athoa* and *A. arcadiensis*).—Leaves in whorls, very hairy, close tufts. Flowers pink. Site sunny. Soil gritty. Flowering Period, May to July. Height, 3 ins.

See also WOODRUFF in *MEDICINAL HERBS.*

ASPHODEL (*Asphodeline* and *Asphodelus.* Nat. Ord. Liliaceæ). —The two genera just named, both of which are popularly known as Asphodel, may conveniently be treated together. Both are hardy perennials and may be grown in any soil of average quality. They may be put to the usual purposes, and are propagated by seeds and root division in the usual way in the spring. They may be planted in March.

What to Grow.—We recommend the following :—

Asphodeline liburnica.—A yellow vivid summer flowering sort, averaging 20–24 ins. in height.

A. lutea.—This also is yellow, and flowers about the same time as the above. It is about the same height, though sometimes it reaches as much as a yard.

A. taurica.—This is whitish, but otherwise similar to *A. liburnica.*

A. tenuior.—A yellow sort blooming in July, and 2 ft. in height or thereabouts.

Asphodelus acaulis. — A useful pinkish species of the second genus named above, flowering in May and June, and averaging 15 ins. in height.

A. fistulosus tenuifolius.—A white July blooming sort, averaging 24 ins. in height.

A. ramosus.—There are various varieties of this which are white and bloom from April to August. *A. r. intermedius* is only half-hardy and should be wintered indoors. The height averages 2–5 ft.

ASPHODELINE.—See *ASPHODEL.*

ASPHODELUS.—See *ASPHODEL.*

ASPIDIOTUS.—See OYSTER SHELL BARK SCALE in *INSECT PESTS.*

ASPIDISTRA (PARLOUR PALM. Nat. Ord. Liliaceæ).—This is a useful ornamental foliage plant for rooms, greenhouse or conservatory, and of easy culture, with the flower scarcely discernible showing above the soil like a little round shield. It is increased by divisions in spring, inserted in light loam, leaf-mould and sand. Temperature needed 40–45° F.

Greenhouse Species. — *Aspidistra lurida.*—Brown. Flowers in May. Green leaves 1–2 ft. in length. Height, 1–2½ ft.

A. l. variegata.—Brown. Flowers in May. Variegated leaves 1–2 ft. in length. Height, 1–2½ ft.

ASPIDIUM. — For the best species and varieties see *FERNS AND FERN GARDENING.*

ASPLENIUM.—For the best species and varieties see *FERNS AND FERN GARDENING.*

ASSES' FINNOCHIO *Foeniculum piperitum*).—See *FOENICULUM.*

ASSIMILATION.—See under FOOD SYNTHESIS in *PLANT PHYSIOLOGY.*

ASSISTING GERMINATION.—Hints on this matter will be found in *GERMINATION OF SEEDS.*

ASTER (STARWORT. Nat. Ord. Compositæ).—Hardy herbaceous perennials and half-hardy annuals. The former range from 1½–6 ft., and the latter from 9–24 ins., in height. A deeply worked well-manured garden soil suits them. They are propagated by seed, division of roots and cuttings.

Cultural Notes.—The true Starworts or MICHAELMAS DAISIES are hardy herbaceous perennials and form the most important section of a widely varied species of plants bearing this name; but the Chinese Asters, also known as *Callistephus hortensis*, which are annuals, likewise fall under the heading of florists' flowers. The perennials are usually increased by division of roots, more rarely by cuttings. They are very useful plants for supplying cut flowers in autumn, and make handsome beds where these can be devoted entirely to different varieties of Starworts.

Starwort Sections:[1]—The various sections have distinct characteristics as follows:—

Aster acris.—Type, starry lilac blue flowers. Height, 2–3 ft.

A. Amellus (ITALIAN STARWORT).—Dwarf growing, with broad hairy leaves. Flowers rather large, varying in colour from pink to violet. Height, 2–2½ ft.

A. cordifolius.—Small, starlike flowers, lilac to white. Very free flowering. Height, 3–4 ft.

A. diffusus.—Medium, flowers white, tinted red. Height, 2½ ft.

A. ericoides (or more correctly *A. multiflorus*).—Heath-like foliage, tiny white flowers, very free and graceful. Height, 2½ ft.

Aster Novae-Angliae (NEW ENGLAND STARWORT).—Flowers large, crimson, purple, and pink. Foliage downy. Height, 4–5 ft.

A. Novi Belgii (NEW YORK STARWORT).—Large flowers freely produced in many shades, including white, lilac, purple, blue, and pink. Strong and tall, growing up to 6 ft.

Varieties.—These are very numerous, and in making a selection the grower should procure a list from a specialist.

CHINA ASTERS are half-hardy annuals; in height they range from 9 ins. to 2 ft. Propagation is by seed sown in March.

Culture.—Seedlings should be carefully thinned out as soon as large enough, and later transplanted into a cold frame. This ensures dwarf and sturdy growth before the plants are finally placed in their flowering quarters about the middle of May, prior to which they must be well hardened off. China Asters make effective bedding plants, and are also grown for conservatory decoration in late autumn. For this purpose seed is sown outdoors in May or June and the young plants potted up just before coming into bloom in September.

Varieties.—Chrysanthemum-flowered, Comet, Ostrich Feather, and Victoria. Each of these may be had in any selected colour.—J. L. G.

---

[1] Other species suitable for general border work are:—*A. grandiflorus*, the CHRISTMAS DAISY; *A. Linosyris*, well known as GOLDILOCKS; *A. tanacetifolius*, the DAGGER FLOWER; *A. Tradescanti*, the MICHAELMAS DAISY; and *A. Tripolium*, the SEASIDE ASTER. The species described are, however, much more desirable than any of these.—EDITOR.

UP-TO-DATE SELECTIONS.

(*Various Types.*)

Aster adfinis.—Yellow and blue. Half-hardy.

A alpinus Shirley.—Mauve-lilac and yellow

A. Amellus Bessie Chapman.—Violet-lavender.

A. Amellus Dr C. K. Mowl.—Extremely useful.

A. Amellus King George.—A notable variety.

A. Amellus Kobold.—Pink and lavender.

A. Amellus Mrs Gladys Forbes.—Pink.

A. Amellus Sonia.—Pink.

A. Amellus Viola.—Violet.

A. California Giant.—Many colours.

A. Comet Buff Beauty.—Pink and yellow.

A. Comet Snow Queen.—White.

A. Comet The Bride.—White and rose.

A. cordifolius Silver Spray.—White.

A. elongatus.—White and blue.

A. Giant Enchantress.—Pink.

A. Large-Flowered Snow Queen.—White and yellow.

A. Novae-Angliae Dr Eckener.—Purple and brown-gold.

A. Novi-Belgii Dorothy May Dilley.—Lavender.

A. Novi-Belgii Eclipse.—A notable kind.

A. Novi-Belgii Empress of Colwall.—Lavender.

A. Novi-Belgii Ethel Ballard.—A beautiful kind.

A. Novi-Belgii Gayborder Beauty.—Mauve-lavender.

ASTER : Rock Garden Species.—Of these there are only one or two. They thrive in well-drained loamy soil and are propagated by division of the roots in autumn and spring or by seeds sown in March and April.

Aster alpinus (BLUE MOUNTAIN DAISY).—Leaves dark green, entire, in rosettes. Flowers in typical species deep purple. Site open. Soil sandy loam. Flowering Period, June to July. Height, 6 ins.

A. a. albus.—Flowers white.

A. a. ruber.—Flowers deep red.

A. subcaeruleus. — Leaves in rosettes, the whole forming close mats of foliage. Flowers bright purple, with yellow disc. Site open. Soil deep loam. Flowering Period, June to July. Height, 1 ft.

ASTER BIGELOVII. — See *BIGELOW'S ASTER.*

ASTER, CHINA.—See *ASTER.*

ASTER, PERENNIAL.—See *ASTER.*

ASTEROCEPHALUS.—Now included in the genus SCABIOSA.

ASTEROTHRIX.—Now included in the genus LEONTODON.

ASTILBE (Nat. Ord. Saxifragaceæ). The cultural remarks under *SPIRAEA* apply equally to this genus, which is so closely allied to the other that in our opinion both should be united. Hybrids are numerous and beautiful, but it is impossible to describe any here, since these plants are being so rapidly improved that any selection would be quickly out of date. The species described below are quite the best, and most of them are grown at Kew.

Astilbe Arendsii.—This is not a species, but a series of hybrids of *A. Davidii* (see below).

A. Aruncus.—This is a name applied by nurserymen to *Spiraea Aruncus*, which see.

A. chinensis.—This is a pretty pink summer blooming sort about a yard high.

A. Davidii (Syn. *A. chinensis Davidii*).—This is an exceptionally fine species bearing rose-violet flowers in May and June on plants 3–4 ft.

high. The popular ARENDSII HYBRIDS, often named as a species (*A. Arendsii*), have been evolved from this. They vary in colour from the palest pink almost to purple, and are splendid border or water garden plants. The blooming period of all extends from May to August if they are well looked after, and the height averages 2–4 ft. The named sorts are so numerous that any selection given here would be quickly out of date. Readers should thus consult the current trade catalogues.

A. japonica (Syn. *Spiraea japonica*).—This is probably the most popular of all, excluding *A. Davidii*, with its pure white flowers in May and June on plants 2–3 ft. high.

A. rivularis (GOAT'S BEARD).—This is a creamy-white sort blooming freely through the summer, and growing, according to its soil and site, 2–5 ft. high.

A. rubra.—This is an attractive rose sort blooming in August, and growing 6 ft. high.

A. Thunbergii.—This is a white summer blooming sort only about half a yard in height, or at the most not more than 2 ft.

NEW VARIETIES.

Astilbe Princess Mary.—This bears rose and violet flowers in wide pyramidal panicles. It is useful alike for garden and greenhouse.

A. simplicifolia rosea.—This bears rose and white flowers. Its foliage is tinted bronze.

ASTRAGALUS (MILK VETCH. Nat. Ord. Leguminosæ).—A genus of mostly robust plants of little garden value. Three or four species are useful in the rock garden. They thrive in deep sandy loam and are propagated by division in autumn, or seeds in spring.

Rock Garden Species.—We recommend the following :—

Astragalus alpinus.—This has short trailing shoots, forming a mat of foliage. Flowers purple. Site open. Soil loam. Flowering Period, July to August. Height, 3 ins.

A. danicus.—Similar in habit to above. Flowers blue and white. Site open. Soil gritty. Flowering Period, June to July. Height, 3 ins. The variety *albus* has white flowers.

A. massiliensis (GUM TRAGACANTH).—A spiny bush, with silvery pinnate leaves. Flowers white. Site sunny. Soil rocky. Flowering shrub blooming June to July. Height, 1–2 ft.

A. monspessulanus.—Leaves pinnate and in tufts. Flowers large, reddish-purple. Site open. Soil deep gritty loam. Flowering Period, June to July. Height, 6 ins.

See also *SHRUBS.*

ASTRANTIA (Nat. Ord. Umbelliferæ).—This is a useful genus of herbaceous perennials which are of easy culture in ordinary soil, and quite hardy. They may be planted in the borders or in the rock garden, and when once established will look after themselves. They are best propagated by root division in the autumn or spring, and the latter period is the best for planting.

What to Grow.—We recommend the following :—

Astrantia alpina.—Syn. *A. minor*, which see.

A. helleborifolia.—This bears pretty pink flowers in June, and grows about half a yard in height.

A. major (BLACK MASTERWORT).—This is the most popular species of all. It bears pink or red-striped flowers from May to July, and grows 2–3 ft. in height. Two useful varieties of it are *carinthiaca* and *variegata*.

A. minor and *A. pauciflora* are two very pretty species suitable for the rock garden. The first bears pink and the second white flowers from June to July, and both average 6 ins. in height.

ATHANASIA.—Now included in the genus LONAX. See *EVERLASTING FLOWERS.*

ATHROTAXIS.—For the best species see *TREES.*

ATHYRIUM.—For the best species and varieties see *FERNS AND FERN GARDENING.*

ATLAS CEDAR (*Cedrus atlantica*).—See *TREES.*

ATMASCO LILY.—A name applied to *ZEPHYRANTHES*, which see.

ATRAGENE. — See CLEMATIS in *CLIMBING AND TRAILING PLANTS.*

ATRIPLEX (Nat. Ord. Chenopodiaceæ).—A very large number of species of this genus are quite worthless in the garden. Orache, or Mountain Spinach (*Atriplex hortensis*), to which we devote another article, is grown as a vegetable, but is not admissible in the flower borders. A variety of it, however, *A. h. atrosanguinea*, certainly deserves notice, as the whole of the plant above ground (and sometimes it reaches 6 ft. in height) becomes a rich crimsom-red or red-purple colour. The flowers of this annual are not attractive, but the seed vessels assume the same bright hue as the stems and leaves, therefore this variety is useful for producing colour effects in the wild garden or the bog garden. It is perfectly hardy and easily raised from seeds sown in early spring or late summer. Fifteen inches between the plants will not be too much space for full foliage development.

ATRIPLEX HORTENSIS.—See *ORACHE, or MOUNTAIN SPINACH.*

ATROPA (DWALE. Nat. Ord. Solanaceæ).—This is a genus of hardy herbaceous perennials which are very poisonous and should be banished from the garden unless grown for medicinal purposes. The best known species is *A. Belladonna*, popularly known as BELLADONNA and DEADLY NIGHTSHADE, the culture of which for medicinal purposes is fully described under the first of these names in our article on *MEDICINAL HERBS*, which see. The plant requires handling with care, and children should never be allowed to pluck or handle it.

AUBERGINE.— See EGG PLANT in *SALAD PLANTS.*

AUBRIETIA (PURPLE ROCK-CRESS. Nat. Ord. Cruciferæ).—This is a slow growing, spreading, dwarf perennial, forming carpets of foliage covered in spring with masses of flowers. It is propagated by division of roots after flowering. These divisions planted in a shady border make good plants for the following spring. In the rock garden the plants should be cut back close after flowering to make them grow more compact. There is only one species generally grown :—

A. deltoidea.—Flowers pale purple. Site sunny. Soil rich sandy loam. Flowering Period, April to June. Height, 4 ins. There are many beautiful varieties, including :—*Bridesmaid* (rosy-pink); *Campbellii* (violet-blue); *Dr Mules* (glowing purple); *Hendersoni* (rich purple); *Leichtlinii* (rosy-crimson); and *Moerheimi* (pale rose).

NEW VARIETY.

Aubrietia rosea splendens.—This bears attractive rich rose flowers.

AUCUBA.—For the best species see *SHRUBS.*

AURELIA.—Now included in the genus *NARCISSUS.*

AURICULA : Historical Notes.

This has, in its day, been one of the most famous of florists' flowers. Its history goes back into a period when the student of floricultural lore has an immense amount of material to draw upon. Without indulging in speculations as to whether it was known to the Romans, for its native home is the Alps, we can certainly trace it back to a starting-point much too remote to allow us to follow up its progress with any degree of detail.

Like many other subjects of the flower garden the Auricula has been known by other names. In old English it was commonly called Bear's Ears, the French and Italian popular names are equivalent, *i.e.* Oreille d'ours and Orecchia d' orso. Bauhin in 1569 named it *Auricula ursi*, from which it is evident that the other names are mere translations. It was so called chiefly from its leaves resembling that animal's ear. Other botanical writers gave it different appellations. For instance, in Mathiolus (1579) it will be found illustrated and described under the name of Sanicle. Clusius (1601) gives several figures of it under the name of *Auricula ursi*, and devotes a whole chapter to it in the third book of his *History of Rare Plants.* John Gerarde in his *Herbal* (1597) devotes chapter cclxii. to an account "Of Beare's eares, or mountaine Cowslips," and there are six wood-cut illustrations of those that he writes about.

A little later John Parkinson in his *Paradisus* (1629) heads his "Chapter XXXIIII. Auricula ursi —Beare's eares." He figures eight varieties on a full-paged plate, giving short particulars of twenty-one kinds followed by notes on the various names under which the flower had been described by other writers, the time of flowering, its habitat and virtues.

John Rea in his *Florilege* (1665) writes an article in chap. xxxi. on "*Auricula Ursi*" which has a distinctly florists' flavour about it. By this time new seedling varieties had evidently been raised and named. He mentions among those early growers "my very good friend, Mr. John Downham, a reverent Divine, and an industrious florist." The clergy of this country, of France and Italy, were then as now eminent in their attachment to flowers. Mr Austen in Oxford, Mr John Good of Balliol College, William Whitmore, Esq., Mr Rickets of Hoxton, and Jacob Bobert of Oxford are all referred to in this connection, and several fantastical names had been bestowed upon the novelties which the raisers had obtained, a sample of this seventeenth-century floral nomenclature being the Fair Virgin, the Matron, the Alderman, Mercury, and a white one called the Virgin's Milk.

As time went on and the cultivation of the Auricula increased and was subjected to the severe rules of the standard set up by the florists, so the literature at home and abroad developed. It is a very voluminous subject and one must be a specialist to understand and absorb it.

In the North of England and Midland Counties the culture of the Auricula among the weavers and artisans became quite a mania. The many shows and continued development of the flower can only be followed up by reference to the periodical horticultural press, which we must pass over as well as the names of the pioneers and champions of Auricula culture who were actively engaged in the work of improvement.

On the Continent, especially in Flanders, the Auricula was much appreciated and widely grown by enthusiasts. Its properties were clearly defined, and there, as in England, the raisers of new seedlings vied with one another in producing flowers that came up to the standard demanded by the exhibitors. In one old treatise printed in Brussels in 1732 the names of the most famous growers of the day are given with their places of residence. The reader will not fail to notice that many of these places have since become notorious by virtue of the prominent part they played in the Great War, 1914–18.

The Auriculas when in bloom were usually staged in pots on stands, called *Theatres*, and the writer of the treatise already referred to tells us that between 20th April and 10th May is the period when the flowers can be seen at their best. The names of the foremost growers are given at Abbeville, Amiens, Cambrai, Chauny, Douai, Haarlem, Laon, Lille, Mondidier, Nesle, Noyon, Paris, St. Quentin, Soissons, Val St. Pierre, Ypres, and other places.

Samuel Gilbert in his *Florists' Vade-Mecum* (1682) gives descriptions of some of those varieties mentioned by Rea. He says under the heading of "Auriculas—Bear's ears, flowers so much now in esteem (and well deserve it) for their diversity of colour and different faces, each adding a new grace to its kind."

There are many famous names of growers in connection with this flower, but we have no space to mention them. The North of England and the Midlands furnished many of them for a long period of time. It is curious too how long-lived some of the favourites were, for *Page's Champion* was one that until quite recent times was well known by the fancier and had been grown for about a century. Some of the green-edged show varieties were very famous. There were *Slater's Cheshire Hero*, *Taylor's Victory*, and many more beside.

Maddock the great Quaker florist of Walworth, followed Thompson of Newcastle and Hudson of the same town with one of the first of the serious treatises on Auricula culture. This was in 1792. It is really wonderful to notice at that time the large number of florists there were who were occupied with cultivating this flower, for sale and exhibition. The plants were sold at prices varying from a shilling each to about three guineas—that being the price asked for *Maddock's Invincible*. The most famous raisers of that day were Buckley, Bury, Chorlton, Clegg, Foden, Gorton, Grimes, Harrison, Maddock, Metcalfe, Potts, Slater, Stretch, Taylor, etc. Collections of 300 plants named, two plants of each, were offered at £35. Smaller collections proportionately less, down to 25 plants unnamed at 10s.; the best Auricula seed fetched ten guineas the ounce.

Isaac Emmerton was the first author of an independent treatise on the flower—the first edition appeared in 1815. Thomas Hogg of Paddington was another well-known author and practical cultivator whose work on florists' flowers (1820) included a treatise on the Auricula and ran through quite a number of editions.

The flower is essentially a poor man's favourite, hardy and requiring but little space; it is one of the choicest of our florists' flowers. On the show table it is an exquisite little gem, forming a dainty contrast to some of those colossal and gorgeous show flowers like the Dahlia and its sister rival the Chrysanthemum.

In later years there have been many eminent amateurs, besides nurserymen, who have specialised in the Auricula. Messrs. Lightbody, Groom, Horner, C. Turner, and others have all done good work in connection with the flower, which to-day has its interests looked after by an organisation known as the National Auricula and Primula Society, at the exhibitions of which the reader can feast his eyes upon some of the most delightful floral gems that Nature, aided by the art and patience of man, has ever yet produced.—C. H. P.

AURICULA (*Primula Auricula*. Nat. Ord. Primulaceæ).—Hardy perennial. Height, 6–9 ins.

Soil.—Well-drained, heavy loam enriched with old manure is suitable for garden or rockery sorts, but the show varieties must be grown under glass to secure protection against the weather. In this case the best medium is two parts turfy loam, one part decayed farmyard manure, and one part half-decayed leaves run through a half-inch sieve, with sufficient coarse sand or crushed oyster shell to keep the soil porous. Propagation is by seed and offsets.

Culture.—Seed can be sown when ripe in July, August, or in spring. Use light sandy soil and barely cover the seed. Germination takes place in ten to fourteen days. Prick out the seedlings as soon as they can be handled, 5 or 6 in a 4½-inch pot, using little or no manure in this compost. In due time pot each plant singly into 2½–3-inch pots according to development, and finally into 4–4½-inch size. Pots of larger size are not recommended, as the flowers are more perfectly developed if the roots are somewhat cramped. Offsets may be taken from the parent plants in spring, and at repotting time in summer. These are usually rooted before separation, and grow into full-sized plants in about two years.

Apart from their value as cold greenhouse plants the Alpine Auriculas are decorative spring subjects for the rockery and for bordering shady beds or edging borders. The main flowering period is throughout April; but blooms will begin to open early in March, and last on through the greater part of May. Occasionally also trusses of bloom will open in autumn.

Varieties.—SHOW AURICULAS: *Green Edged.*—Prince Charming, Shirley Hibberd, William Smith.

Grey-edged.—Geo. Lightbody, Geo. Rudd, Richard Headley.

Selfs.—Favourite, Fingo, Harrison Weir.

White-edged.—Acme, Eucharis, Guy Cranfield.

ALPINES:—Argus, Golden Dustman, Firefly, Kaffir, Majestic, Mrs. Douglas, Muriel, Prime Minister, Prince of Tyre, Phyllis Douglas, Roxborough, and St. Vincent.

J. L. G.

NEW VARIETIES.

ALPINE SORTS:—*Edith.*—This bears fragrant flowers having a maroon body, a broad margin of purple, and a yellow eye.

Pilatus.—This has flowers with a blackish-purple body, a silvery-purple edge, and a creamy-white eye.

Silverwood.—This has flowers with a maroon body, a bright crimson edge, and a white eye.

SHOW SORTS:—*Edenside.*—This bears fragrant heliotrope, self-coloured flowers.

Gordon Douglas.—This bears large, fragrant, golden-yellow self-coloured flowers.

AURICULA.—See *Primula Auricula* in *PRIMULA*.

AURINIA.—Now included in the genus *ALYSSUM*.

AUSTRALIAN BRACKEN (*Pteris tremula*).—See *FERNS AND FERN GARDENING*.

AUSTRALIAN GUM TREE.—See *EUCALYPTUS*.

AUSTRIAN BRIAR (*Rosa lutea*).—See *ROSE SPECIES*.

AUSTRIAN BRIAR ROSES.—See *ROSE CLASSES*.

AUSTRIAN HYBRID ROSES.—See under PERNETIANA ROSES in *ROSE CLASSES.*

AUSTRIAN PINE (*Pinus Laricio nigricans*).—See *TREES.*

AUTUMN-BEARING STRAWBERRIES.—See *STRAWBERRIES.*

AUTUMN BLOOMING ROCK PLANTS. See ROCK PLANTS FOR AUTUMN BLOOMING in *ROCK PLANTS FOR ALL PURPOSES.*

AUTUMN CROCUS (*Colchicum autumnale*).—See *COLCHICUM,* also under CROCUS in *MEDICINAL HERBS.*

AUTUMN-FLOWERING BULBS (for the Rock Garden).—See *ROCK GARDEN BULBS.*

AUTUMN-FLOWERING CROCUSES. See under SPECIES AND VARIETIES in *CROCUS.*

AUTUMN GARDEN : THE.

Few people are not struck by the beauty of the autumn garden, with its grass, and flowers and plants spangled with September dews, and its glorious colours. Only, however, are the autumn days too short, the evenings soon draw in, and outdoor gardening in the evenings is greatly curtailed. The leaves fall from the trees, making a "litter," and the autumn winds blow sadly, though sometimes fiercely around, and the fact that winter is fast coming on is again and again forced upon us. I am not myself nearly as fond of the winter as the summer,—for, of course, the summer time is the active time and the beautiful time in the garden,—and this feeling is shared by many people, who also dislike the long wet winters we have, but certainly at these seasons there is much that can be done if the results next spring and summer are to be good.

However, I am rather wandering from my subject. The present article is not about the winter garden, but about the autumn garden.

Tidying Up.—Of course, gardeners say it is their first duty to do tidying up as the autumn season comes on and passes. And such is very necessary on big places where there is much in the way of trees and pleasure grounds. Nothing looks worse than a large lawn semi-covered with rotting leaves. Nothing pictures lack of care and pride in the garden as much as herbaceous borders from which the dead remains of plants have not been removed, but have been allowed to remain decaying for three or four weeks. In the autumn season weeds go to seed and the same unkempt and uncared-for appearance results if they are not rooted out of borders and paths. So, in a word, it is a most necessary thing to do to tidy up.

In the Woodland.—But while tidying up is essential if the pleasure grounds are to look as they should, it would be a waste of time and indeed bad policy to spend hours in the woodland brushing up the leaves as they fall, as some people do. In these days of expensive labour, and labour so hard to get withal, gardeners and gardening folk should not tidy more than need be. For after all, the woodland is the woodland, and it is here that the autumn effects are so beautiful. Here also Nature may be left to her own will, tidying up being done if necessary when the winter has come. Leaves are, of course, the natural food of the soil of the woodland, and should not be swept up more than necessary.

If the leaves from the trees in the pleasure ground are to be used for the purpose of leaf-mould, then pine needles and "acrid" leaves must be kept out. Some say that only oak and beech leaves should be used, but most of us have not enough of these to supply our wants, and so use others as well. Leaf-mould is made best by stacking the leaves in the open and covering with a good weight of stable manure.

Planning Next Year's Garden.—Ere it is too late to notice them, the plants which are not in suitable positions in the borders should be marked and new positions decided upon and pictured if possible in a plan.

But, of course, much other actual planning can be done. Readers can well use the long autumn and winter evenings by making plans of new borders, blue borders, yellow borders, red borders, "annual borders," "perennial borders," and also, of course, structural alterations. Such plans should be well thought out, and will be ready to put into practice in the late winter or next spring. Many people, as has so often been pointed out, make up their minds and do alterations all in a hurry, and then they wonder why they are disappointed by the ill effects. Gardening, like other occupations, needs a vast deal of thought if good effects are to be produced, and it is in the autumn and winter months that new plans can be given that all-important thought.—E.

AUTUMN HARVESTING. — See *ALLOTMENTS: MANAGEMENT OF.*

AUTUMN SOWING: Some Views on.

Much has been said and written about the sowing of annuals in the autumn, but perhaps a short article may be useful to readers of the Dictionary who it is possible have not seen the correspondence about it in the Press recently.

Personally I am not in favour of autumn sowing, at any rate in cold northern districts where the garden is exposed to winds which sweep down from the moors or hills, and an extensive trial with certain well-known hardy annuals showed the plants to be weak and spindly at the end of the winter. But I am quite willing to consider both sides of the question, and any who have sheltered borders would do well to try autumn sowing, as there is no doubt that when it "comes off" the results the following summer are highly enviable.

Certain plants are much hardier than others. Such strong annuals as *Calendula officinalis*, the Clarkia, the Feverfew (this last is, however, a weed in most gardens near here), the Godetia, and the Shirley, or the Common Poppy, are examples, but there are many others quite as hardy. All come very readily when they sow themselves naturally in their own way at the end of the season. Many of these seeds never germinate till the spring, so they miss the cold winter above ground. We have, for instance, some Calendula growing at the edge of the border with splendid blooms on, and this has sown itself from some plants set the previous season. The same with poppies. They sow themselves readily and appear where not required—that is no uncommon occurrence. I have found with several annuals that they come up all right if left to themselves, but not nearly so satisfactorily if one takes trouble to sow them.

This fact suggests an idea which may seem comparable to laziness. If self-sown annuals come up so well, why not let them be self-sown and pull up the old plants in the winter or next spring? Such a proceeding I would not commend, but I believe it has been seriously suggested many times before this. It is evidently not desirable for the following good reasons: (1) Because the soil cannot be dug up and manured meanwhile; (2) because the seedlings are likely to come up somewhat irregularly; and (3) because this necessitates the land being cropped with the same plant for at least two successive seasons. Other reasons may occur to the reader.

People will say that all these reasons are to be disannulled. Taking the first one they will ask, "Why should not the soil be dug and manured? Your wild poppies and feverfew come up irrespective of that." Yes they do, but they are not wanted, and as aforesaid the seed may fall into the ground too late to germinate the same autumn. Moreover, we can truthfully say that the vitality of the seeds of most of our weeds bids fair to be greater than that of any other seeds known; it must be, or they could not exist. And if the garden be dug over at all correctly, the surface layer of the soil containing the seeds will be buried at least 9 ins. The seeds of our shier garden flowers, and indeed those of the hardier of the annuals, cannot be expected to come through that.

The second danger given above is not so great, but nevertheless it is quite serious enough. It is admitted that the spring-sown annuals have to be thinned out, and thinned out mercilessly. But the danger is on the other side. We can thin out excessively thick seedlings;—indeed, we must do this somewhat heart-breaking task as soon as ever the plants are large enough, be that in the autumn after they have appeared or next spring, but—and this is a very big "but"—we can expect no success if we try planting out the "thinnings" on the bare spaces on which the seed has unluckily not fallen.

Again, however, the reader may exclaim, "Why not sow some seeds on the bare spots in the spring, or why not plant something else there when bedding-out time comes?"

But as to the former we have already said that spring-sown ones are always later than successful autumn-sown ones, so the gap in the group of annuals is still apparent; and with regard to the latter, the planting of such spots to harmonise with the surroundings is not far from impossible, if the bare spaces be towards the back of the plot containing tall annuals.

The question of rotation is not considered by many who are really serious flower gardeners. But the principle which I will state directly is almost essential to the prolonged success of the vegetable garden, and I see no reason why it should not apply to flowers as well. Broadly, the principle of Rotation of Crops states: "That every particular crop takes from the land a certain particular compound necessary and essential for that certain plant's development, and, that if a given piece of land be cropped for many successive years with one certain crop, irrespective or almost irrespective of the fact that the land is manured once a year, that piece of land will become impoverished of the certain compound necessary for the plant, and that the plant will cease to flourish there in consequence."

Of course two successive years or even more would be much less serious if the land was properly manured than if it was not, but it is far better to change the land given even for certain flowers each year if at all reasonably possible. Hence our third reason for avoiding this practice.

Up to this point we have remarked on the self-sowing of annuals freely, and we have decried it. I have already said that I myself do not care for autumn sowing of annuals at all, but those in other warmer parts of the country have by one means or another obtained the following all-desired results: (*a*) Strong plants, (*b*) flowers much earlier than spring-sown annuals, (*c*) flowers of better quality. [This last is, I fancy, only occasionally, seeing what excellent results we get from spring-sown annuals.] (*d*) A prolonged supply of bloom most of the summer if the plants are attended to and the seed vessels removed, and (*e*) seed if to be saved can be had in plenty, of good quality, and is ripe early.

Such advantages as these are, of course, likely to tempt the gardener, but whether the game is worth the candle—what with the risk of loss of seed, etc., in each particular case—this fortunately is not my business to decide.

But if, as said before, it "comes off," splendid plants are often obtained (these, of course, by sowing the seed in a prepared bed as described hereafter). I have read that plants of Clarkia and Godetia, especially when autumn sown, sometimes form bushes a foot across, and I do not doubt this. Specimen plants of annuals of that size must be truly fine when in full bloom.

So I do not urge people not to try autumn sowing. It will, I admit, produce great results in good positions; but what I do say is that those whose gardens are exposed to all the cold winds which blow may save themselves the trouble and disappointment of trying autumn sowing.

We will now give a brief résumé of the practical details connected with autumn sowing, since to close an essay on autumn sowing without giving these seems to me somewhat absurd.

Last year a new idea was told me when it was too late to try it, but I hand it on in case some readers may not know it.

The gentleman I was talking to referred to autumn sowing, and he said, "The new idea is to sow the seeds on a north border." The prevailing idea, that the north border is the coldest one in the garden, here seems mistaken. My friend explained that if the north border gets frost, it at any rate gets very little sun, and at times it is the sun after frost which does the damage. As I have not tried this I can only give what I am told. But I should think it inadvisable to try the experiment on a north border which is also open to cold east winds.

The more usual way of proceeding is to choose a piece of land adjoining a wall facing due south. The desirability of its being sheltered from the other points of the compass is generally accepted. The land is dug over and has some rotten manure incorporated *deeply* into it; no surface manuring should be allowed. Then the land can be levelled and permitted to settle for some days, after which some old soot may be forked in at desire, and the surface raked fine. Sow the seeds very thinly in beds, lines, or clumps, and cover lightly with soil. Label accurately. Thin as soon as possible, and in cold weather it is advised to cover the bed with hand-lights, supported mats, or straw, removing these as soon as the danger is past.

E.

AUTUMN WEEDING.—See *ALLOTMENTS: MANAGEMENT OF.*

AUVERGNE PINK (*Dianthus arvernensis*).—See *DIANTHUS.*

AVENA (OAT. Nat. Ord. Gramineæ).—This genus is not of much importance to the gardener, but of great importance to the farmer, as Oats are one of its species (*A. sativa*). The best species for the garden is *A. sterilis*, the ANIMATED or WILD OATS described in our article on *ORNAMENTAL GRASSES.* It is known at Kew as *A. fatua.*

AVENS.—A name applied to *GEUM* which see.

AVENUES.

The planting of avenues of trees is a garden operation which is, alas, on the decline. Avenues look so stately and noble that it is a great pity to let the practice drop. There should, of course, be some definite object at the far end of the avenue, such as a house, tower, monument, or the like. Elms, Oaks, Horse Chestnuts, and many other trees are suitable for avenue planting, and Limes look very well, but by far the most striking effect is produced if the avenue be made of Copper Beeches.

AVERAGE GERMINATION OF SEED. See *SEED: AVERAGE GERMINATION OF.*

AYRSHIRE ROSE (*Rosa arvensis*).—See *ROSE SPECIES*. For the best varieties see *ROSE CLASSES*.

AZALEA[1] (Nat. Ord. Ericaceæ).

Very beautiful free flowering shrubs. The Indica hybrids with single and double flowers are quite indispensable for decorative purposes, from January to May. They are propagated by cuttings of half-matured wood in spring, and should be potted firmly in good peat and silver sand. The cuttings should be placed in a temperature of 55° F., under a bell-glass or hand-light. Temperature needed when potted 40–50° F.

Greenhouse Species.—*Azalea amoena.*—Crimson-purple. Flowers in April. Height, 1–2 ft.

A. balsaminaeflora.—Salmon-red. Flowers in April. Height, 1–2 ft.

A. indica (INDIAN AZALEA).—Scarlet. Flowers in May. Height, 1–2 ft.

A. linearifolia.—Rose. Flowers in March. Height, 1–2 ft.

A. obtusa.—Red. Flowers in March. Height, 1–2 ft.

A. ovata.—Pink. Flowers in April. Height, 1–2 ft.

A. o. alba.—White. Flowers in April. Height, 1–2 ft.

A. rosaeflora.—Rosy red. Double. Flowers in March. Height, 1–2 ft.

Good Indica Hybrids.—*Azalea Apollo.*—Double scarlet. Flowers from January to May. Height, 1–2 ft.

A. Deutsche Perle.—Double White. Flowers from January to May. Height, 1–2 ft.

A. Hermosa.—Bright rose. Flowers from January to May. Height, 1–2 ft.

A. J. T. D. Llewellyn.—Rose with red markings and white border. Flowers from January to May. Height, 1–2 ft.

A. Mdlle. Marie Rosseel.—Flesh coloured. Flowers from January to May. Height, 1–2 ft.

A. Vuylstekeana.—Brilliant crimson. Flowers from January to May. Height, 1–2 ft.

See also *RHODODENDRON.*

AZALEA: Hardy Species.

As a general rule no culture distinct from that given to Rhododendrons is required by these species, though they are often used for more select purposes. The following species, which we recommend as being distinct, include all the best hardy Azaleas. The greater number of the synonyms have been purposely omitted for the sake of simplifying the list, and reference should be made to nurserymen's catalogues for varieties of garden Azaleas commonly sold as GHENT AZALEAS. For convenience of reference the names of the Rhododendrons under which these Azaleas appear in the *Kew Hand-list of Trees and Shrubs* are added. The heights given are approximate only.

---

[1] This is now correctly included in the genus *RHODODENDRON* (see separate article), but in gardens the two are still regarded as distinct genera.—EDITOR.

Azalea arborescens (Syn. *Rhododendron arborescens*). — Red flowers in June. Height, 10–20 ft.

A. calendulacea (Syn. *Rhododendron calendulaceum*).—Orange flowers in June. Height, 2–8 ft.

A. californica (Syn. *Rhododendron californicum*).—Purple flowers in May or June. Height, 2–8 ft.

A. indica (Syn. *Rhododendron indicum*). — The INDIAN AZALEA. See above under GREENHOUSE SPECIES. The variety *balsaminaeflorum* (Syn. *A. rosaeflora*) is hardy and has salmon flowers in May. Height, 1 ft.

A. ledifolia (Syn. *Rhododendron ledifolium*).—White flowers in June. Height, 2–6 ft.

A. linearifolia (Syn. *Rhododendron linearifolium*). — Rosy-lilac flowers in May. Height, 1–2 ft.

A. mollis in variety (Syn. *Rhododendron sinense*).—Flame-red flowers from May onwards. Height, 3–6 ft.

A. nudiflora in variety (Syn. *Rhododendron nudiflorum*). — The PINXTER FLOWER. Pink or white flowers in April. Height, 3–4 ft.

A. occidentalis (Syn. *Rhododendron occidentale*).—White flowers in May. Height, 2–6 ft.

A. pontica in variety (Syn. *Rhododendron flavum*).—Yellow flowers in May and June. Height, 4–6 ft.

A. Vaseyi (Syn. *Rhododendron Vaseyi*).—Pink flowers in April. Height, 2–4 ft.

A. viscosa (Syn. *Rhododendron viscosum*).—The SWAMP HONEYSUCKLE. Pink flowers in May and June. Height, 2–4 ft.—S. A.

See also *RHODODENDRON*.

AZALEA LEAF BLISTER. — See *DISEASES OF PLANTS*.

AZALEASTRUM (FALSE AZALEA. Nat. Ord. Ericaceæ).—This is a group of Rhododendrons requiring the general culture outlined in the article on *RHODODENDRON*. The best species are *Rhododendron albiflorum*, with its white flowers in June on plants 2–3 ft. high, and *R. ovatum* with its purple-spotted purplish-rose flowers in May on plants 2–3 ft. high.

AZALEODENDRON.

This is only a generic name from the nurserymen's point of view. Botanically it is now a series of hybrids of *Rhododendron sinense*. Many of these are of great value in the garden, and are known as *Azalea mollis Hybrids*.

AZARA.—For the best species see *CLIMBING AND TRAILING PLANTS* and *SHRUBS*.

AZAROLE (*Crataegus Azaroleus*).—See *TREES*.

B

BABIANA (BABOON-ROOT. Nat. Ord. Iridaceæ).—Babianas are half-hardy bulbs, whose native home is the Cape of Good Hope, where they are a favourite food of the baboons. From this circumstance the Dutch colonists gave the plant the name of Babiana: "Babianer" being the Dutch for baboon. As a rule the pale-green foliage is hairy and the flowers brightly coloured, some being blue and some being crimson.

Culture.—It is only in the very warmest parts of the British Isles that outdoor culture can be attempted with any prospect of success, and Babianas should be treated as pot-plants except in such localities. The bulbs may be potted in October, placing about six bulbs in a 5-inch pot. They like a light compost, made up of sandy soil, leaf-mould, and rotten cow manure. A winter temperature of from 40–50° F. suits them. Water should be sparingly given until the growth has well advanced, when a little help from weak liquid manure is beneficial if given at every other watering. Babianas may be grown from year to year, if after flowering the pots are kept in a warm greenhouse and the plants regularly fed until the foliage begins to turn yellow, when water must be gradually decreased, until the leaves wither, when it must be entirely withheld.

Varieties.—As a rule Babianas are offered in mixture. The colours vary very much—scarlet, crimson, mauve, blue, and purple being available. The best sort is—

Babiana stricta rubro-cyanea.—This has brilliant blue flowers with a basal zone of crimson. It blooms about April, if slowly forced, and grows about 1 ft. in height.

J. J. & E.

BABOON-ROOT.—See *BABIANA.*

BACHELOR'S BUTTONS (*Ranunculus acris flore pleno*).—See *RANUNCULUS : PERENNIAL BORDER SPECIES.*

BACTERIAL DISEASES. — See *DISEASES OF PLANTS.*

BACTERIOLOGY. — See *EDUCATION AND GARDENING.*

BACTERIOSIS IN TOMATOES.—See TOMATO BACTERIOSIS in *TOMATO DISEASES.*

BAD FISH.—See *FISH AS MANURE.*

BAKING SOIL.—See *SOIL STERILISATION.*

BALANINUS.— See NUT WEEVIL in *INSECT PESTS.*

BALDINGERA. —Now included in the genus *PHALARIS.*

BALDMONEY.—See *MEUM.*

BALLOTA (STINKING HOREHOUND. Nat. Ord. Labiatæ).—This is a genus of herbs and weeds of no garden value, though some are used for herbal medicines. *B. nigra* (Syn. *B. vulgaris*) is probably the best known species. It is popularly known as BLACK HOREHOUND. *B. Pseudo-dictamnus* (Syn. *Marrubium Pseudo-dictamnus*), known by some nurserymen as FALSE DICTAMNUS, or FALSE DITTANY, is another species not unlike a very coarse growing Dictamnus. See articles on *FRAXINELLA* and *MARRUBIUM.*

BALM (*Melissa officinalis*). — See *MELISSA* and *POTHERBS.*

BALM OF GILEAD (*Abies balsamea*). See *TREES.*

BALSAM (*Impatiens Balsamina.* Nat. Ord. Geraniaceæ).—This is a half-hardy annual growing about 18 ins. high. A rich soil with good drainage is required, and abundant moisture must be provided during the growing season. Propagation is best effected by seed.

Culture.—Seed sown in heat in February will produce flowering plants by June, and successional sowings will prolong the flowering season till the autumn. Sandy loam and leaf-mould in equal parts is a good medium for the seedlings. These should be pricked out early, and potted on as occasion demands, till finally the plants are accommodated in 6- or 7-inch pots. A compost made up of maiden loam and decayed farmyard manure in equal parts, with a little leaf-mould or fibrous peat, and some silver sand, will then produce good results in this latter stage. The atmosphere of the house should always be kept moist, or red spider is likely to become troublesome. Frequent fumigation is desirable. See article on *FUMIGATING.*

Uses.—Balsams are splendid for decoration of conservatory or greenhouse, and are sometimes employed for summer bedding out of doors.

Varieties.—Selected strains of seed should be purchased from a well-known seedsman.—J. L. G.

BALSAM FIR (*Abies balsamea*).—See *TREES.*

BALSAM POPLAR (*Populus balsamifera*).—See *TREES.*

BAMBOOS.

The evergreen, woody plants known collectively as Bamboos belong to several genera of the Bambuseæ tribe of the order Gramineæ. Some of the principal genera are :—

Arundinaria, Bambusa, Cephalostachyum, Dendrocalamus, Dinochloa, Gigantochloa, Melocalamus, Melocanna, Ochlandra, Oxytenanthera, Phyllostachys, and *Thyrsostachys.* So far as the British Isles are concerned, however, *Arundinaria* and *Phyllostachys* are the two most important genera.

Habit.—Bamboos vary a good deal in habit, ranging from giant plants with stems 100 ft. high and 9 ins. in diameter, to low-growing species 1½ ft. high with stems of less diameter than a knitting-needle. Allowing for this variation, however, the species of the various genera have certain points in common. For instance, they all spread by means of rhizomes, which may be very short or little more than the production of a growth bud from the parent stock immediately below the ground line, or of considerable length running about beneath the ground after the manner of couch-grass. Old stems, again, are constantly maturing and dying without bearing flowers, new ones taking their place until the age limit or period of maturity of the particular species has arrived, when all the living stems almost at once lose their sterile condition, and with every new one that appears produce flowers, bear seeds, and, as a rule, die. The period of maturity only occurs at long intervals, perhaps in thirty, forty, or more years; then, however, the plants growing over hundreds of thousands of acres usually flower at the same time, seed and die, to give place to a new generation which continues to flourish until in its turn the flowering age is reached. Flowering takes place in the case of cultivated plants as well as in that of plants growing in a state of Nature, therefore it behoves the cultivator to collect seeds whenever possible for the purpose of perpetuating his stock, for seedlings enjoy a longer life than plants raised by any other means. Another item possessed by Bamboos in common is the regularly jointed stems, the stems being hollow between the joints and every joint bearing when young an attendant sheath.

Uses.—In tropical countries short sections of the larger stems cut beneath a node are used for plant receptacles, instead of the, to us, more familiar flower-pots, whilst strong stems are in demand for house-building, bridges, fences, and other structural purposes. Smaller stems have considerable value for the manufacture of furniture, stakes, fishing-rods, walking-sticks, etc.; rods split into narrow strips are made into ropes and plaited into mats; young growing joints are used as a vegetable and old stems are macerated and made into paper; the seed is a valuable food grain and has been known to take the place of the commoner cereals in some tropical countries in times of scarcity. These, though but a few of the many varied uses of the Bamboos, serve to indicate the enormous economic importance of the group, more particularly to the residents of tropical countries, whilst they are brought prominently into notice in other countries in many ways.

Bamboos are more characteristic of the arboreal vegetation of tropical and sub-tropical countries than of temperate climes, although there are many hardy species from Japan, a few from China and the Himalaya, and one from North America. Asia is the great Bamboo-producing continent, India and Burma being the headquarters of the family. Many of the species are of purely tropical origin and are of little value for cultivation in this country, the temperate ones being of greater worth from a decorative standpoint.

In the following notes the culture of hardy and tender species is given under different headings, the descriptions being followed by a selection of hardy and tender species in alphabetical order, each one marked as to hardiness.

Outdoor Culture.—Hardy Bamboos became popular with the garden-loving public during the last decade of the nineteenth century, for, although a few species had been introduced about the middle of the century and grown here and there from that time onward, many more were received from Japan about 1892, and from a few collections formed about that time, a stimulus was given to general planting, with the result that there are now few gardens of importance in the country where Bamboos are not to be found. Unfortunately in the early days a good deal of indiscriminate and injudicious planting took place, with the result that they were at times comparative failures, thereby earning a bad name in some quarters. Bamboos at their best are amongst the most charming evergreens we possess; they are not, however, suitable subjects for every position, and instead of mixing them in shrubberies with other shrubs or including them as isolated lawn specimens in prominent places, they ought, whenever possible, to be given a position to themselves or be grown with such kindred plants as *Arundo* and *Miscanthus*, a little apart from the shrubs. The reason for this is that whilst Bamboos are peculiarly attractive for six or seven months of the year, from July onwards, they are decidedly dingy during spring and early summer when most shrubs are at their best, for the first cold winds of late winter cause the leaves to shrivel and turn brown, a condition maintained until the new leaves develop in June.

When selecting a site for a Bamboo garden choose a semi-shady position sheltered from cold winds but not impoverished by the roots of trees. The banks of a lake or stream often form a charming garden, and the proximity of water is valuable in dry weather. Rich light loamy soil is the most suitable, but success can be attained in heavy loamy soil approaching a clayey nature. Trench the ground and incorporate leaves and manure, cow manure for preference, allow the ground to settle, then in May, or when the new shoots are about an inch long, carry out the planting. Water well and mulch the ground with leaves or decayed manure. Although Bamboos usually grow freely when transplanted in May, they often suffer severely if disturbed at other times. As a rule, if abundance of room is given in the first instance, they will grow for many years without disturbance. It is, however, a good plan to water them a few times during the growing season with liquid cow manure, and to surface the ground above the roots with manure at least every second year. Pruning takes the form of removing each spring some of the older stems, or such as appear to be dying, the work being done during early April. Be careful to remove the growths quite close to the ground line. Never shorten a shoot half-way; if it must be cut, take it clean away.

Propagation should be carried on by means of seeds whenever possible; but as seeds are rarely available, one of the following methods, division, cuttings, or layers, must be selected. Division means the removal of large or small sections from the parent stock and treating them as separate plants. Large sections can be planted at once in the open ground, but small pieces should be potted and placed in a moist greenhouse until new roots are active. Cuttings are formed of sections of stems one or two nodes, usually two, in length. Roots are formed from the node inserted in the soil, and growth is from dormant buds. This method is not practised much here, but some of the vigorous species in the tropics respond well to this method of increase. Layers consist of pegging shoots down into the soil, a notch being sometimes cut at each node, although this is not absolutely necessary. Roots and shoots appear in due course, which can be removed as separate plants. May is a good time for division and layering.

Bamboos planted in large pots or tubs are useful for the decoration of large rooms in winter, and for this purpose the hardy kinds are more desirable than the tender ones. They can be kept in good health by feeding and proper attention to watering. In dry weather all Bamboos should be given a good supply of water. Cut branches of Bamboos are not of much value for decorative work, as the leaves soon shrivel.

Most of the hardy Bamboos are included in the two genera *Arundinaria* and *Phyllostachys*, *Bambusa* containing one or two species of little value. As they are likely to claim more attention than other genera, the following remarks on their distinguishing characters are appended. *Arundinaria* and *Phyllostachys* are readily distinguished from each other by the following peculiarities:—In *Arundinaria* the side-shoots are in dense clusters of an indefinite number each and the culm or stem sheaths are retained on the stems long after they are dead, whereas in *Phyllostachys* the side-shoots are in groups of three each, two large and one small, the latter sometimes falling away soon after it matures, and the sheaths are very early deciduous.

Indoor Culture.—It is only practicable to cultivate the tender Bamboos successfully in lofty structures where a moist atmosphere can be maintained, and even in those places they ought not to be overdone, for it must be remembered that they have neither attractive flowers nor luscious fruits to recommend them. Nevertheless a few can be admitted to large palm houses and winter gardens with marked success. For winter gardens where a minimum winter temperature of 40–45° F. is maintained all those that come from sub-tropical countries may be grown, the tropical species requiring a minimum 10–15° higher. They may be grown in pots, tubs, or borders, border culture being the most satisfactory. In either case thorough drainage must be provided, and rich loamy soil containing sharp sand and half-inch bones. Keep the plants well watered, and well syringed or hosed overhead, otherwise the leaves will become a prey to thrips and red spider. Prune and propagate as advised for the hardy species. Those grown in pots and tubs will require frequent applications of liquid manure during the growing period.

A CHOICE SELECTION.

Arundinaria.—*A. anceps*, from the North-west Himalaya, has slender, erect branches 12–14 ft. high, and rather small, dainty, bright green leaves. It spreads rapidly and forms picturesque masses. Hardy.

A. angustifolia.—This is a low-growing plant with slender stems 2–6 ft. high, forming dense clumps. Native of Japan. Hardy.

A. aristata.—An elegant plant 8–12 ft. high, from the Eastern Himalaya, suitable for the warmer parts of the country but hardly suitable for general outdoor planting.

A. armata.—A vigorous plant with spiny stems at least 20 ft. high and 1–1¾ in. in diameter. Its leaves are 6–9 ins. long and ¾–1½ in. wide. Native of Upper Burma. Requires a warm structure.

A. auricoma is a Japanese species growing 4 ft. high, with slender stems. The leaves are distinct by reason of their golden variegation. Hardy.

A. elegans.—This is a graceful plant with stems 12–20 ft. high and less than an inch in diameter, the leaves being 4–5 ins. long and up to ½ in. wide. Native of Assam and Burma. Requires a warm greenhouse.

A. falcata is a very graceful tall-growing plant 15–18 ft. high. The stems are grouped closely together, the lower parts erect, the upper bending gracefully outwards. The leaves are usually 3–4 ins. long and less than ½ in. wide, larger on young vigorous shoots. Native of the Western Himalaya. Half-hardy.

A. Falconeri is a closely allied species from the Himalaya. It is rather tender but grows into very attractive specimens in Cornwall and Ireland. It is excellent for cool winter gardens. The stems are used for fishing-rods, basket-work, etc.

A. fastuosa (Syn. *Phyllostachys fastuosa*).—There are few handsomer hardy species than this and none to keep better colour in spring. The strong erect stems exceed 20 ft. in height and are 1½ in. thick. Native of Japan.

A. Fortunei is a dwarf plant from Japan rarely exceeding 2 ft. in height. The leaves are prettily variegated with silver. Hardy.

A. graminea.—An erect, handsome plant 10–12 ft. high, with rich green narrow leaves. Native of Japan. Hardy.

A. Hindsii is closely allied to *A. graminea* but is much coarser in character and less useful.

A. Hookeriana.—A handsome fast-growing plant at least 20 ft. high, with strong stems over 1 in. thick. Leaves 6–12 ins. long and ½–1½ in. wide. Native of Sikkim and Bhutan. Suitable for Cornwall and for a cool winter garden.

A. intermedia.—A vigorous species 12 ft. or more high, with leaves up to 8 ins. long and 1 in. wide. Native of the Western Himalaya. Branches used for baskets, fishing-rods, etc. Can be grown out of doors in Cornwall, but not generally hardy.

A. japonica (Syn. *Bambusa Metake*).—This is perhaps the hardiest and best known of all Bamboos. A native of Japan, it was introduced in 1850. The stems are 12–15 ft. high and the leaves large and attractive. Hardy.

A. nitida is a very dainty species from Central and Western China. Growing about 10 ft. high, it forms dense masses of slender arching stems clothed with the daintiest of pale green leafage. It is one of the most beautiful of all Bamboos but quickly suffers from drought. Hardy.

A. palmata (Syn. *Bambusa palmata*).—This is a vigorous fast-spreading plant with slender but stiff stems 6–8 ft. high, bearing large leaves up to 12 ins. long and 3 ins. wide. Native of Japan. Can be cut down to the ground line every three or four years if desired. Hardy.

A. pygmaea grows from 12–18 ins.

high, with very slender stems which form a dense mass. Native of Japan. Can be cut to the ground every second year. Hardy.

A. Ragamowskii (Syn. *Bambusa tessellata*) has the distinction of producing larger leaves than any other hardy Bamboo. They are sometimes 18 ins. long and 4 ins. wide. It is not a very striking plant, however, and only grows about 3 ft. high. Native of China. Hardy.

A. Simonii is an erect plant from China, with stems 18 ft. long. It is fast growing and often represented in gardens by large masses. There is a variegated form but it is not effective and has no horticultural value. Hardy.

A. tecta is the single hardy species from America. It grows wild in the south-eastern United States, and forms a dense mass of stems 6–8 ft. high. It is not a very effective plant.

Bambusa.—*B. Alphonse Karrii.*—There is some doubt as to the origin of this plant, but it is striking by reason of its stems being striated with gold and green. It is probably hardy in the mildest parts of the country, but elsewhere should be grown in a cool greenhouse.

B. arundinacea.—An Indian species distributed widely on the plains and low hills, also found in Ceylon. Height, 80–100 ft., with a diameter of 6 ins. or more. An important species from an economic standpoint but too tender for outdoor culture here. Plant in a warm greenhouse or large stove; it is too vigorous for any but the largest structures. It is peculiar by reason of its very spiny stems.

B. polymorpha.—This tall-growing species attains a height of 80 ft., with stems up to 6 ins. in thickness. A native of India, it can only be grown in warm houses here.

B. Tulda, a vigorous species 30–70 ft. high, native of India, is of little horticultural value as it can only be grown in large houses. Its stems can be used for building purposes, paper, etc.

Cephalostachyum.—*C. flavescens.*—This Burmese Bamboo is an elegant habited species 15–20 ft. high, with stems up to 1½ in. in diameter. It is a graceful plant suitable for a warm greenhouse.

Dendrocalamus.—*D. giganteus* is one of the largest growing Bamboos, attaining a height of 100 ft., with stems up to 10 ins. in diameter. Native of the Malay Peninsula, etc., and cultivated in India, it is an important species from an economic point of view. Its large size is against it for indoor cultivation, although it is sometimes included in lofty palm houses, as at Kew.

D. sikkimensis is another large-growing species, for it exceeds 50 ft. in height, with stems up to 7 ins. in diameter. It is curious by reason of its purplish, intensely hairy culm-sheaths. A native of Northern India. It requires a warm greenhouse.

D. strictus, 20–50 ft. high, with stems 2–3 ins. in diameter, is widely distributed in India. It is a handsome plant suitable for a warm greenhouse.

Gigantochloa.—*G. verticillata.*—This is a large-growing species from the Malay Peninsula. It is met with 80–100 ft. high, with stems 5 ins. in diameter. Its stems are of value for building purposes, etc. It can only be grown here in a warm glass structure.

Oxytenanthera.—*O. abyssinica* is a tropical African species at least 50 ft. high, with stems 3 ins. in diameter. The leaves are up to 10 ins. long and 3 ins. wide. Plant in a tropical house.

Phyllostachys.—*P. aurea*, a native

of Japan, has yellowish stems 12–15 ft. high. It is of erect habit and distinguished by the crowded nodes near the base of the stem. Hardy.

P. Castillonis, from Japan, may exceed 12 ft. in height. It has golden stems, with the exception of the flat portion between the nodes, which is bright green. The leaves are sometimes variegated. Hardy.

P. flexuosa, native of China, is a handsome plant of elegant growth, with stems 8–10 ft. high.

P. Henonis is another very beautiful plant of graceful outline, growing 10–12 ft. high. Native of Japan. Hardy.

P. mitis is not very hardy, but in mild districts it sends up erect growths to a height of 20 ft. Native of Japan.

P. nigra, growing up to 20 ft. high, is a handsome and useful species from Japan. It is distinguished by its black stems. In the variety *punctata* the stems are mottled. Hardy.

P. Quilioi grows 12–18 ft. high and bears handsome foliage larger than that of other species of Phyllostachys. Native of Japan. Hardy.

P. ruscifolia, a dwarf species from Japan, grows about 2 ft. high, and has no special value. Hardy.

P. viridi-glaucescens is perhaps the best-known species of the genus, for it was introduced from China about the middle of last century. Growing 12–18 ft. high, it forms very large clumps with graceful arching branches. Hardy.

Thyrsostachys.—*T. siamensis* is a strong plant with stems 20–30 ft. high and up to 3 ins. in diameter, from Siam. It is of no value here, for it can only be grown in a tropical house, but it has an economic importance in Siam.—W. D.

See also *WATER GARDEN: PLANTS FOR THE.*

BAMBUSA.—A species of Bamboo. See *BAMBOOS.*

BANEBERRY.—See *ACTAEA.*

BANFFYA.—Now included in the genus *GYPSOPHILA.*

BANKS' PINE (*Pinus banksiana*).—See *TREES.*

BANKS.

These are usually necessary to support higher ground in the garden, and are preferable to walls inasmuch as they can be made far more beautiful. There are various kinds of banks, on some of the more important of which we enlarge below:—

Grass Banks.—These are the most unsatisfactory of all banks, inasmuch as they are very rarely tidy and hardly ever look well. The grass has to be kept short, and this is not easy even with a scythe, since, if the banks are at all steep, it is impossible to use the tool. For the same reason it is impossible to use the mowing machine. Grass banks are fortunately less common than they were ten years ago; it is time they gave place to something more beautiful.

Rock Banks.—Rocks of varying sizes may be used with great effect for the holding up of soil to form banks, and these are about the most satisfactory kind of bank there is. Herbaceous plants, rock plants, and most of the hardier subjects described in our article on *CLIMBING AND TRAILING PLANTS*, may be effectively used for clothing them, and where the choicer alpines are used, some rocky steps should be arranged at intervals so that it is easy to get to them for the purpose of watering.

Rose Banks.—Where turf banks exist it would be much better either to remove the grass altogether or to take out holes in it, and in both cases to plant rambler roses on it.

Such sorts as *Crimson Rambler*, *Dorothy Perkins*, *Minnehaha*, and *White Dorothy* simply revel in such sites if the soil is made reasonably rich. Very little pruning is necessary, and the more the roses are allowed to have their own way the more lovely they look.

Shrub Banks.—These are far too abundant and cannot be recommended, since none of the choicer shrubs look really happy on them, with the exception, perhaps, of the stronger Rhododendrons on very slightly sloping banks. The coarser Laurels and so on will thrive well enough, but are apt to become leggy and ugly, while Azaleas and the choicer Rhododendrons, though often used for clothing such banks, seldom do as well as they would in shrub borders. The average shrub bank is as unspeakably ugly as a rose bank is unspeakably lovely.

Wild Banks.—These are often necessary and look well in the wild garden. In the winter they are beautiful with woodland-loving bulbs, and in the summer wild annual flowers are usually grown on them. Wild banks often lead down to lakes or ponds for the wild garden, and should never be far removed from the water garden. A combination of wild gardening and shrub gardening on a gentle slope leading down to a lake has great possibilities, and if flowering shrubs are freely used some wonderful colour pictures may result.—E.

BANKSIAN ROSES. — See *ROSE CLASSES*.

BAPTISIA (Nat. Ord. Leguminosæ). About half a dozen sorts of this may be recognised as species, though over a dozen have been described as such. All are hardy herbaceous perennials of very easy culture, thriving in ordinary garden loam in a sunny or very lightly shaded spot. They may be propagated by division of the roots in the usual way from November onwards, and the best planting period is March. The two best sorts to grow are :—

Baptisia australis.—A blue June flowering sort growing about a yard high.

B. tinctoria (WILD INDIGO).—A yellow July flowering sort growing half a yard high.

BARBADOS GOOSEBERRY (*Pereskia aculeata*).—See *CACTI*.

BARBAREA.—See *WINTER CRESS*.

BARBARY OAK (*Quercus Ballota*).—See *TREES*.

BARBERRY.—The genus BERBERIS and *Berberis vulgaris*. See *SHRUBS*.

BARCELONA NUT. — See *NUT CULTURE*.

BARLEY.—See *HORDEUM*.

BARLEY GRASS (*Hordeum murinum*). See *HORDEUM*.

BARLEY WATER.—See *HORDEUM*.

BARNYARD GRASS (*Panicum Crus-galli*).—See *PANICUM*.

BARON'S MERCURY (*Mercurialis annua*).—See *MERCURIALIS*.

BARR'S HYBRID DAFFODIL (*Narcissus Barrii*). — See *NARCISSUS SPECIES*.

BARRELS, CAPACITY OF. — See under VOLUMES in *ARITHMETIC AND GARDENING*.

BARRENWORT.— See *EPIMEDIUM*. The name is also applied to *Vancouveria hexandra*. See note to this in *VANCOUVERIA*.

BARROWS.— See *GARDEN APPLIANCES*.

BARTONIA.—This is a synonym of *MENTZELIA*, which see.

BASE.—For explanation of this term see *CHEMISTRY FOR GARDENERS*.

BASE ROCKET (*Reseda lutea*).— See *RESEDA*.

BASIC SLAG.—See under PHOSPHATIC MANURES in *MANURES*, and under CALCIUM ORTHOPHOSPHATES in *LIME COMPOUNDS*.

BASIC SUPERPHOSPHATE.—See under PHOSPHATIC MANURES in *MANURES*.

BASIDIOMYCETES.—A group of Fungi. See *FUNGOUS DISEASES*.

BASIDIOSPORES.—See *RUST FUNGI*.

BASIL.—The genus OCIMUM and *O. Basilicum*. See *OCIMUM* and *POT-HERBS*.

BASIL THYME (*Calamintha Acinos*). See footnote to *CALAMINT*.

BASKET PLANTS.

The cultivation of various kinds of plants in hanging baskets is desirable from an æsthetic standpoint and also from the fact that certain species respond more kindly to that method of culture than to any other. In the first place basket plants add considerably to the appearance of greenhouse, conservatory, or corridor by breaking up the vacant head-space, whilst well-chosen subjects are seen to greater advantage than they would be were they grown in any other way. Secondly, the compost in which the plants are growing is always well aerated and there is less chance of its becoming sour or otherwise unsuitable for the maintenance of plant life than when it is enclosed in pots or forms borders. This alone is a great consideration in the care of certain species that are difficult to grow, and the large number of Orchids requiring basket treatment may be cited as belonging to this class. With Orchids, however, we have nothing to do in this article but rather to subjects that are available for more general use.

Baskets made of galvanised wire or wood are most frequently used, the former being the more serviceable. In some instances wire baskets are manufactured for ornament rather than plant cultivation, and it is wiser that the grower should select those of simple make, the ordinary plain round one being most serviceable. Care must be taken to ascertain that they are strongly made, for faulty construction may lead afterwards to the destruction of a finely-grown plant. When wooden baskets are used they should be made of teak, for that wood stands the damp conditions better almost than any other.

When preparing the baskets for the accommodation of plants they should be lined with moss, good fibrous loam or peat. Loam or peat, according to the plants to be grown, are preferable to moss. Good pieces, at least 3–4 ins. across, should be placed round the wires, then the remaining space filled in with a suitable compost. A tidy finish is ensured by rubbing the outside round with the hands and clipping off any long fibres. It is better to use young vigorous plants for baskets than to select well-grown subjects, for they are more easily manipulated and trained into the desired formation. Further, if basket plants are beginning to deteriorate, it is better to destroy them and commence again with young stock rather than to try to doctor them. It is rarely possible to remove plants from baskets and place them in larger ones, and if it is thought desirable to give more root room the best plan is to place the old basket inside the new one and fill in the vacant space with new soil. Vigorous plants can, however, be kept in excellent condition for a considerable period by weekly application of manure water or some chemical manure. When baskets are first filled with plants they should be kept in a warmer structure, until growth is active, than is required later on.

The Best Basket Plants.—In the following notes attention is directed to some of the most suitable plants for baskets:—

FUCHSIAS are charming basket

plants, and they are available for everyone, in addition to being suitable for greenhouses, conservatories, and for porches, summerhouses, etc. Varieties of free, spreading habit should be chosen, and one to three plants 5–6 ins. high placed in a basket 15–18 ins. across. If the baskets are filled in March, excellent specimens can be produced by the end of May which will blossom throughout the summer. A few good varieties for the purpose are—Avalanche, Charming, Daniel Lambert, Elizabeth Marshall, Loveliness, Rose of Castile.

SHRUBBY BEGONIAS with trailing branches form good basket plants. These should be pegged round the sides of the basket as they elongate, and some shoots may be trained up the supporting wires. The best of all is *B. glaucophylla*, a handsome plant with reddish flowers. Others with erect branches such as *B. gracilis*, *B. kewensis*, and *B. coccinea* can also be used, whilst *B. "Gloire de Lorraine"* never looks better than when growing in a hanging basket.

ASPARAGUS SPRENGERI forms a well-furnished basket of greenery, its long plumose shoots hanging from the basket to a depth of 2–3 ft. During the autumn and winter the green leaves are often relieved by red berries. Other notable and useful species are *A. crispus*, *A. scandens*, and *A. verticillatus*.

FERNS are popular basket plants for moist greenhouses and stoves. Most of the Adiantums or Maidenhair ferns are available as also are the finer growing Hare's-foot ferns (Davallias), such as *D. canariensis*, *D. elegans*, and *D. repens*. The following are also useful: *Asplenium bulbiferum*, *Gymnogramme elegantissima*, *G. schizophylla* and variety *gloriosa*, *Hypolepis distans*, *Nephrolepis cordifolia*, *N. exaltata*, the various Stag's-horn ferns, particularly *Platycerium alcicorne* and *P. æthiopicum*, etc.

Although not usually grown in baskets, the various ACHIMENES give excellent results as basket plants. When filling the baskets the corms should be so placed that they will grow from the sides and bottom of the basket as well as from the top. *A. coccinea*, *A. grandiflora*, and *A. Verschaffeltii* are specially worthy of note.

LACHENALIAS can also be successfully grown in baskets, the bulbs being placed in the same manner as described for Achimenes. The Rat-tail Cactus (*Cereus flagelliformis*) forms an excellent basket plant for a sunny greenhouse or window. It ought not, however, to be given a very large basket.

Another member of the Cactus family suitable for baskets is *Epiphyllum truncatum*; this thrives best in a rather moist and warm house. The various varieties of Phyllocactus can also be used.

An out-of-the-way plant for a sunny greenhouse is Sturt's Desert Pea (*Clianthus Dampieri*). Most people who have seen this gorgeous plant in flower try to grow it and usually fail. If, however, they sow seeds of *Colutea arborescens* singly in thumb pots a fortnight in advance of seeds of the Clianthus, then as soon as the Clianthus seedlings appear, and before they form their first true leaves, graft them upon the Colutea stocks, they will have every chance of success. It forms a very beautiful basket plant.

Hardy plants such as Ivy, *Lonicera japonica variegata*, and *Vinca minor* can all be requisitioned for outdoor baskets if desired. Ivy-leaved geraniums are excellent subjects for outdoor work in summer. Young plants placed in baskets in March or early April, and kept indoors until early June, produce well-furnished specimens which remain in bloom all summer. In some instances several species of plants are placed in the same basket, but as a rule single examples are the more effective. In addition to the plants mentioned many others will suggest themselves to those who are interested in the subject.

W. D.

BASSWOOD (*Tilia americana*).—See *TREES*.

BASTARD BALM.—See *MELITTIS*.

BASTARD BOX (*Polygala Chamaebuxus*).—See *POLYGALA*.

BASTARD CEDAR.—The genus CEDRELA, which see under *TREES*.

BASTARD CORK OAK (*Quercus Pseudo-suber*).—See *TREES*.

BASTARD CRESS.—See *THLASPI*.

BASTARD CYPERUS (*Carex Pseudo-cyperus*).—See *CAREX*.

BASTARD LUPINE (*Trifolium Lupinaster*).—See *TRIFOLIUM*.

BASTARD MILLET.—See *PASPALUM*.

BASTARD TRENCHING.—See under TRENCHING in *SOIL CULTIVATION*.

BATH ASPARAGUS (*Ornithogalum pyrenaicum*).—See *STAR OF BETHLEHEM*.

BATODES.—See SMALL APRICOT AND VINE MOTH in *INSECT PESTS*.

BATSCHIA.—Now included in the genus *LITHOSPERMUM*.

BAY-LEAVED WILLOW (*Salix pentrandra*).—See *TREES*.

BAYONET PLANT (*Aciphylla squarrosa*).—See *ACIPHYLLA*.

BEACH PLUM (*Prunus maritima*).—See *TREES*.

BEAKED PARSLEY.—See *ANTHRISCUS*.

BEAN APHIS.—See *INSECT PESTS*.

BEAN POD CANKER.—See *DISEASES OF PLANTS*.

BEAN RUST.—See *DISEASES OF PLANTS*.

BEANS (Nat. Ord. Leguminosæ). Of these there are many sorts. The following notes deal with all those usually cultivated :

Broad Beans (*Vicia Faba*).—These are one of the most accommodating crops, thriving well in almost every district and upon any soil. However, a little extra attention in the way of manure or deep digging generally increases the size of the bean and number of the pods.

On very light soils sowings may be made from November to the end of May, but where this is of a wet nature, sowing is not advised before March. Sow in double rows 5 ft. apart, allowing 6 ins. between the plants in the rows, and cover the seed with not more than 2 ins. of soil. Spinach and turnips may be grown between the rows. If either are sown, it is important these should be withdrawn as soon as of usable size.

A plan finding much favour among those having a heated greenhouse is to sow the seed 3 ins. apart in shallow boxes early in the year, removing these to a cold frame when the plants are 3 ins. high, planting into open quarters about the end of March. The earliest crop must be well earthed when 6 ins. high. Nip the tops out of the plants as soon as the bloom is fairly set, to serve the double purpose of destroying numerous insects and hastening the development of the pods.

GOOD VARIETIES include Bunyard's Exhibition, Exhibition Long Pod, Giant Windsor, Hartington Long Pod, Improved Windsor, Kinver Monarch, Knight's Tremendous, and Leviathan.—F. R. C.

Climbing French Beans (*Phaseolus vulgaris*).—These are distinct from the ordinary Dwarf French Bean. They are very heavy croppers, but need less support than the ordinary Runner Bean, otherwise the treatment is similar. In this section there are several varieties of tall-growing Butter Beans, all of which are worth attention. *Princess of Wales* and *Tender and True* are among the best French Climbing.

Dutch Brown Beans (*Phaseolus vulgaris*).—These came much to the front during the recent terrible European War. Analysis shows that they are much richer in true food (protein) than beef, and they also contain a large quantity of valuable carbohydrates which are totally absent in beef. They found much favour when tried at the Wisley Gardens, and seed was distributed to Fellows, by the Royal Horticultural Society, during the spring of 1918. The Society warns growers not to eat the pods, as is done in the case of Dwarf French, or Runner Beans, but to allow the seeds to ripen, shell them, dry them, and use them for winter food, as to eat the young pods is very wasteful.

CULTURE.—A rich soil is necessary for the successful culture of these Beans, the seed of which should be sown about 15th May, or later still if the district be cold and exposed. Each seed should be set 1 ft. from the next, and each double drill should be 2 ft. from its neighbour. They should on no account be planted with a dibber. Frequent hoeing, feeding, and watering are advisable.—EDITOR.

Dwarf Beans (*Phaseolus vulgaris*).—With good cultivation these form one of the most useful among summer crops. The reason why this fact is not more fully recognised is due to the prevailing error of sowing only in poor ground, and failing to allow sufficient space between the plants. A good open spot should always be selected and a good dressing of half-decayed manure given. Then you start on the high road to success.

CULTURE.—From 18 ins. to 20 ins. should be the minimum space between rows, and each plant allowed a clear foot from its neighbour. Seed sown more closely in a wet season often encourages rotting off; any surplus not required may be transplanted to other quarters and invariably provides a useful "follow on" to the original row.

The plants need abundance of water, especially after the first pods commence to swell. Where water is scarce and the soil light a mulch of some kind should be placed over the roots as soon as flowers show. For this purpose old hotbed manure, tan, or leaf-soil answers very well.

Gather all pods as soon as they are fit for cooking, even if these have to be given away. By so doing the productive power of the plant is maintained, but should even a few pods reach the ripening stage no further pods need be expected to form.

GOOD VARIETIES.—Canadian Wonder, Everbearing, Magnum Bonum, Osborne's Forcing, Perfection, Plentiful, and Reliance are as good as any.

The **Dwarf Wax-pod,** or **Butter Bean** (*Phaseolus vulgaris*), is worthy of extensive cultivation, coming to maturity earlier in the season than others in this section, the beautiful golden pods being very freely produced. These pods are best if cooked whole, and are of very delicate flavour.

Sow from the end of April until the first week in July, or, for very early picking, sow under glass the first week in April, and plant out six weeks later in a sheltered spot, protecting from cutting winds. [In very cold exposed districts sowing out of doors is not recommended before early June.—ED.]

Runner Beans (*Phaseolus multiflorus*).—During recent years a great advance has been made in this section; and certainly no popular vegetable of to-day better repays good cultivation than a first-class variety of these; the number and length of the pods produced by a hundred good healthy plants being almost incredible to those who know only the older varieties.

Culture.—Plenty of good fat manure for the roots to feed upon, ample room for the large leaves to develop, together with unstinted supplies of soft, or rain water, sum up the secrets of successful culture.

Start early in the spring by choosing a site in the open garden, right away from trees of all kinds. This should be thoroughly trenched or double-dug, well mixing plenty of nearly fresh manure with the bottom spit of soil. For a row the width of the ground should be a full yard.

Seed for the earliest crop should be sown from the middle to the end of April; for later crops until mid-June. [In very cold exposed districts seed should not be sown out of doors before the third week in May.—Ed.]

Upon the ground previously trenched, draw out a drill not less than 6 ins. deep, and 15 ins. wide, treading the soil moderately firm. Sow the seed in a double row, allowing 10–15 ins. between each seed, always putting in a few extra at each end of the row for later transplanting should any of the others fail to germinate. Cover with about 3 ins. of soil.

Before the plants commence to run, give each a good stout stick or pole 8–10 ft. long, and instead of inserting this quite close to the plant, and thus damaging the young roots, put it midway between the plants in a perfectly upright position, tying the sticks in opposite rows together, a few inches from the top, or, better still, have a good stout and perfectly straight stick tied horizontally at nearly the top of the poles to which these may be tied, thus ensuring greater neatness and stability.

As already pointed out, moisture is of the greatest importance, it being almost impossible to over-water a well-prepared row; but very hard water, or water from a deep well, should be exposed to sun and air for several hours before using, it being possible to kill outright the most healthy plants by using such water too freely.

Syringing overhead each evening after a hot day is most beneficial, especially when the flowering stage is reached, and syringing two or three times a day will hasten the setting, also the development of the pods. Liquid manure should be given after the first pods are 6 ins. long, or equally good results will follow the use of fish manure, sprinkled along each side of the row at the rate of 2 oz. to the lineal yard. This last should be lightly pricked into the soil with a fork, and afterwards well washed in.

For Exhibition.—If extra large pods are desired allow each plant to carry but a single shoot; single rows of plants would also be preferable. From these plants all side growths or laterals should be removed, and as soon as the best shaped pods can be discovered, select not more than two from each truss.

Where the soil is very light, liquid manure may be given twice a week from the time the pods are a few inches long until the end of September. On heavy soils once a a week will be ample, but no matter what may be the nature of the soil, a light mulch of rich manure applied along each side of the row early in August will be an advantage. Gather all pods before they become too stringy for the table; the retention of such upon the plants prevents the development of others.

Good Varieties for large pods include Emperor, Exhibition, Hackwood Park Success, Mammoth Scarlet, and Mammoth White, Prizewinner, Sutton's A1, and Sutton's Best of All.

Stringless Beans (Tall). — These are not very popular among vegetable growers, but are well worthy a place in gardens where a great variety of vegetables is valued. If treated liberally in the matter of manure and moisture the cropping powers are extraordinary, the long pods hanging in great clusters. Not being of such robust growth as the ordinary Runner Bean, the sticks usually used for tall peas answer well for these. The pods are stringless and if preferred may be cooked whole. Sow the seed early in May, a distance of 6–9 ins. apart in the row being ample.—F. R. C.

Up-to-date Selections.

Broad:—*Dwarf Gem.*—Extremely hardy.

Colossal Windsor.—Immense size.

Masterpiece.—First-class quality.

Royal Dwarf Fan.—An excellent early sort.

Climbing French: — *Climbing Canadian Wonder.*—Heavy cropper.

First in the Field.—A grand early sort.

Dwarf French:—*Early Wonder.*—Crops over a long period.

Hundredfold.—First-class quality.

King of the Dwarfs.—Very heavy bearer.

Kidney:—*Canadian Express.*—A very early sort.

Lightning.—Fine for forcing.

Runner:—*Southampton White Mammoth.*—Pods 12 in. long.

Scarlet Unique.—Immense cropper.

Stringless Runner:—*Everbearing Stringless.*—Entirely devoid of cellulosal fibre.

Marrow.—Wonderful cropper.

Waxpod:—*Dwarf Golden.*—Long length and fine flavour.

Giant Runner.—A splendid early sort.

Dwarf Golden Queen.—Very heavy cropper.

Runner Golden King. — Fine flavour, and first-class colour.

For Method of Bottling see *Vegetable Bottling.*

BEAR BERRY (*Vaccinium Arctostaphylos*).—See *Shrubs.*

BEAR-BIND.—See *Calystegia.*

BEAR OAK (*Quercus ilicifolia*).—See *Trees.*

BEAR'S BREECH.—See *Acanthus.*

BEAR'S-EAR SANICLE.—A name applied to *Cortusa*, which see.

BEARBERRY (*Arctostaphylos Uva-ursi*).—See *Medicinal Herbs* and *Shrubs.* This name is also applied to the whole genus.

BEARD GRASS.—See *Andropogon* and *Polypogon.*

BEARD TONGUE.—A name applied to *Pentstemons*, which see.

BEARDED IRISES.—See under Non-Bulbous Species in *Irises.*

BEARSFOOT.—See *Helleborus.*

BEAUTIFYING GRAVES. — See *Graves, Beautifying.*

BEDDING, CARPET.—See *Carpet Bedding.*

BEDDING OUT, Practical Hints on.

There are many hundreds more failures in Bedding Out than there should be, and these failures result from lack of attention to small practical details more than anything else. In this article we propose to deal with the practical side of the question, leaving another contributor to deal with the subject of *Bedding Schemes for Summer and Winter.*

Our first consideration in Bedding Out must be the

Preparation of the Site.—It seems to us that very few gardeners realise what hungry subjects Wallflowers and other winter bedding plants are, or they would not put summer plants in their positions without well manuring the beds first. This mistake is most often made: it is the rarest thing for summer beds to be thoroughly manured prior to the planting. Winter bedding plants will not need a lot of additional food if planted in October in beds which have been previously well manured for summer bedding plants, but more often than not the question of manuring beds at all, whether for summer or winter plants, is waved aside and the plants are put in soil which grows yearly poorer.

Poor soil for summer bedding plants is a very serious matter, in fact it may mean total failure. Rich soil, on the other hand, is one of the high roads to success, and should always be available.

Of the manures to use, the two we prefer are very old cow manure, and old hotbed manure. The cow manure is preferable for a light soil. The manure should be dug in immediately the old bedding is off the land, and should be buried about 10–12 ins. down.

Hardening the Plants.—Probably the greatest fault of all in summer bedding is to omit to harden the plants completely before setting them out in their new positions. We should think this mistake obvious, and its prevention equally obvious, but this is not the case. We constantly see boxes of plants transferred direct from frames, which have been kept closed and warm for many weeks, to borders during cold weather, and plants so treated cannot avoid being greatly checked. Hardening off is more fully dealt with in a separate short article on the subject, so all we need do now is to insist on the wisdom of gradually inuring the plants more and more to being in the open air for many weeks prior to planting out.

Dry Weather Planting.—It often happens that in late May or early June when the summer bedding plants have to be put out, the soil is very dry, and the same thing frequently occurs when the winter bedding is put down in October, if the month of September has been nearly rainless. Dry weather planting is never a great success, and it may be a complete failure. In any case precautions should be taken. Both the new sites and the present sites of the plants should be very freely watered the night before re-planting, since it is only thus that the work can be safely done. It is no good thinking that a drop of water is enough for the purpose: it is not: what is wanted in both cases is a thorough good soaking.

Mistakes in Planting.—It is not often that care is taken of the bedding plants when they are being lifted from nursery beds outside, from boxes in frames, or knocked out of pots. Gardeners frequently drag the plants up anyhow, or roughly knock them out of the pots tearing the crocks away with no regard at all to the tender roots of the plants. These are terrible mistakes. The plants should be most carefully lifted with a small handfork with as large a ball of soil on their roots as possible, or in the case of the pot-plants they should be turned out of their pots with some care, the crocks being removed so gently that no roots are injured at all and the soil ball remains unbroken.

Further mistakes are to attempt to plant with a wide dibber, and to plant so loosely that the plants can most easily be pulled out of the ground.

The former mistake is almost too foolish to comment upon, since it should be obvious that no plant can thrive if it is cramped into a hole far too small for it, and at the same time finds a cavity of air immediately under the ball of soil for its roots to run in. Obviously a hole should be taken out with a trowel or with the hand, which is amply large enough to hold the ball of soil and roots without any cramping. Care should be taken not to bury the plant deeper than it was originally, or it may damp off. The matter of loose planting deserves a special word of comment. Gardeners as a whole utterly fail to see the necessity for firm planting; otherwise we should never see a single one out of the hundreds of cases we do see of plants "falling over" immediately after being re-planted. Firm planting is essential if there is to be immediate new root action, and new root action is essential if the plant is to become established in its new position, hence firm planting is the high road to establishing bedding plants successfully. We certainly consider that the firmer the plants are made in the ground the quicker they become established; this has been proved by comparison with loosely set plants of the same genus.

Another mistake in planting is overcrowding. Gardeners wishing for immediate effect always seem to forget that the plants require room to grow during the next four months. Thus the appearance of the borders is soon utterly spoilt, and the plants completely ruined because too many have been put into one border. As a rule a distance of 6 ins. apart each way should be the absolute minimum for summer bedding, except when the plants are really exceptionally small. Where the plants are of fair size, 9 ins., or even as much as 12–14 ins., apart each way will be required.

Yet another mistake is to put plants with glaring, clashing colours side by side; but as this point is fully dealt with by other contributors, we do not propose to comment upon it here.

Watering after Planting.—In hot weather the bedding out should very preferably be done in the late afternoon or evening. Thus immediately it has been completed the plants can receive and should be given a thorough good soaking of warm water from a fine-rosed can. This will settle the soil about their roots and do more than anything else to establish them. Next morning very early it is advisable to syringe them lightly over, and the same evening another good watering can be given. It may be necessary to continue the daily watering and syringing for a week or more, after which it may be stopped and only done in very hot dry weather. Never water the plants in hot sunshine or they will be badly burnt. Even in very wet weather some of the borders will need watering if they have been protected by the dwelling-house from the driving rain.

Feeding.—Certainly bedding plants are much neglected in the matter of feeding, but no class of plants repay it better. Weak liquid manure applied once a week has a truly wonderful effect on their growth and flower-productiveness, and this fact should be appreciated by gardeners. Phosphate of potash or ammonia, sulphate of iron, and superphosphate of lime, so long as given at about half the usual strength, have a wonderful effect, and so also has very weak liquid animal food. Both should be kept off the foliage.

Small Matters.—Early attention should be paid to the clipping of the grass verges of the bedded-out borders, for nothing detracts so much from their appearance as does a shaggy beard. Attention should also be given to removing dead flowers, to training the trailing varieties of plants down in the way they should go, and so on. When a plant fails, take it out and set something else in its place. When plants make long undesirable shoots without flowers, cut these shoots out and use them if need be for propagating purposes. Keep all bedded-out borders weeded, for flowering weeds detract greatly from the appearance, and are apt to disgrace the gardener in the eyes of his friends. In the cases of both winter and summer bedding, be "in time" with regard to the plants. Baby seedlings are no possible value; they will not flower for many months, and this lateness is wasted time. Sow them early enough; then the plants will be on the large, rather than the small, side. This inevitably means earlier, larger, and better flowers, so it is worth taking a little trouble in this direction. With winter bedding do not wait until the bad winter weather sets in during November. Put your plants in place in October; then they will have a good chance to get established before the bad times start.—E.

BEDDING PANSIES.—See *PANSIES: CULTURE OF.*

BEDDING PLANTS FOR CITY GARDENS.—See *TOWN AND CITY GARDENING.*

BEDDING PLANTS, CULTIVATION OF. A glance down the list of summer bedding plants will show what great variety there is both in type and hardiness of the plants. For instance, next to each other we have the hardy annual Calendula and the half-hardy perennial shrubby Calceolaria. We could write at great length on the cultivation of bedding plants, but owing to space limitations we must refrain from entering into all unnecessary details and give a few really practical hints instead.

The Start.—As a general rule a start is made by sowing all the half-hardy or tender annuals and perennials in boxes in heated pits, frames, or glasshouses, during January or early the following month. It is a usual maxim that the smaller the seed, the finer the seed-bed and the lighter the soil covering of the seed must be. Very small seed should be mixed with ten times its own amount of fine silver sand. Extra choice, very small seed should be sown on the surface of pans or boxes after covering the soil completely with a thin layer of silver sand. The seed after sowing is then lightly covered with more sand.

The greatest care must be taken in sowing to sow extremely thinly to allow room for growth before pricking out commences. After sowing, the pans or boxes should be immersed to within an inch of their rims in a trough of warm water, the water being allowed to soak through. When this has taken place, the pans, etc., are covered with slates to keep them dark until the seed germinates.

A suitable compost for sowing and pricking off seedling bedding plants is made by mixing equal parts old loam and old leaf-soil with as much as ¼ part of sharp silver sand, and a generous dash of wood ashes, old soot, and bone-meal.

Pricking Off.—The early stages of the plants are the most important of all, for on them depends success or failure in the future. You will never get a long lanky seedling Schizanthus to give you a good bunch of bloom, nor will small sturdy "stumpy" seedlings give poor bad flowers. From the first moment the seed starts germinating, care should commence. All possible excess of moisture must be avoided or damp will set in. The plants must be brought gradually to the light, and after that given all the light and air possible, otherwise they soon turn spindly. Early pricking out should be done, the plants being set 3–4 ins. apart each way very firmly in large rectangular boxes. These after being watered are shaded for a few days and then put on the shelf close to the glass and given further doses of light and air. Early in May transfer the lot to cold frames and harden off. (See short article on *HARDENING OFF.*)

Hardy Annuals.—When these are used as bedding plants they should be sown in early March in pans or boxes of prepared soil, and the same efforts made as described above to induce them to make short sturdy growth. They are pricked off into other boxes in April, and planted out during the following month. They may also be sown in the reserve garden, pricked off there, and re-planted into their permanent "bedded-out" positions.

Hardy Biennials. — These are mostly used, when used for bedding at all, in winter or spring work. They are for this purpose sown in open sunny reserve garden beds, or sown in a frame, in June or July, pricked off into nursery beds 6 ins. apart from plant to plant, and transferred to their permanent quarters in manured land during October. Firm planting is essential to success.

Hardy Perennials. — These when used for summer bedding and raised from seed are treated almost exactly the same as are half-hardy annuals, being sown in January or February, pricked off in March or April, hardened off, and planted out in May or June. When used for winter bedding, sow in June or July.

Greenhouse Plants.—These, when used for summer bedding, are encouraged to grow rapidly from February to May by giving them more heat than half-hardy annuals and plenty of moisture. They are then very gradually hardened off and planted out in June after all danger of frost is over.

Disposal of Bedding Plants. — When the summer is over and the autumn frosts commence, it is usual to pull up the summer bedding plants and destroy them. Where a supply of winter bloom is wanted in the greenhouse, however, this can often be obtained by lifting the best plants from the beds with care, and potting them on at once. When there are plenty of plants this need not be done, and certainly it should not be bothered with in the case of any of the commoner flowers. Care should be taken to see that a sufficient supply is kept for next year's possible needs. These are boxed up close together and put into a cool greenhouse, water being withheld except when absolutely needed.

Cuttings of Bedding Plants. — Undoubtedly the best months to take these are July and August. Then they can with the greatest ease be struck by inserting them in a slightly shaded bed of sandy soil, or in the case of Geraniums in a sandy bed in full sunshine. Moisture at the root and occasionally overhead will soon induce the formation of roots. Gardeners should realise that an enormous number of half-hardy bedding plants can be propagated in this way. Some men consider that a frame is absolutely essential; so it is if the propagation is not started until cool September sets in, but during July and August it is not in the least necessary, except in the case of a very few "shy" plants. Far better to reserve a stock of rooted cuttings of bedding plants at a safe period, rather than wait for an unsafe period and then depend on all the cuttings rooting. Usually if the plants have been properly managed, there is no lack of young succulent growth ideal for cuttings during July and August, so they should unhesitatingly be taken. It is only necessary finally to reiterate here that all summer bedding plants intended for next season should be out of the open garden and under suitable cover in heated structures by September 30th, since a sudden frost may otherwise kill the lot. Also all winter or spring bedding plants should be in place by the end of October to give them a good start before the winter.—E.

BEDDING PLANTS, CUTTINGS OF.—See CUTTINGS OF BEDDING PLANTS in *BEDDING PLANTS: CULTIVATION OF.*

BEDDING PLANTS, SELECTED LISTS OF.—The following are specially selected lists of some of the best plants for use in bedding.

SUMMER BEDDING PLANTS.

Agathæa cœlestis.
Ageratum Blue Perfection, Little Dorrit, etc.
Alonsoa Warscewiczii.
Alyssum Lilac Queen, maritimum, minimum.
Amarantus tricolor.
Anagallis grandiflora.
Antirrhinum Dobbie's Brilliant, Primrose King, Amber Queen, Carmine Queen, Cottage Maid, Nelrose, Queen of the North, Tom Thumb (many colours).
Arctotis grandis.
Asters, Comet, China, Chrysanthemum-flowered, Paeony-flowered, Quilled, Dwarf Victoria, etc. etc., varieties and colours too numerous to mention.
Balsam, Ryder's Prize, The King, The Queen, Dobbie's Selected, Ryder's Dwarf Bedding.
Bartonia aurea.
Begonia Dobbie's Selected Single, and Blackmore's Double.
Beta Chiliensis.
Brachycome iberidifolia Blue Star, and White Star.
Browallia grandiflora.
Calceolaria Dobbie's Perfection, Ryder's Superb, etc.
Calendula Dobbie's Orange, Meteor, Prince of Orange, Favourite, etc. All splendid plants.
Calliopsis Crimson King, Drummondii.
Candytuft White Spiral, Rose Queen, White Rocket, Little Prince.
Cannas, any Crozy varieties.
Celosia pyramidalis Thompsoni.
Centaurea candidissima and Cyanus, especially dwarf Cyanus.
Cerastium arvense, tomentosum.
Chrysanthemum coronarium, inodorum, tricolor, Lord Beaconsfield, Morning Star and Northern Star.
Cineraria maritima.
Clintonia pulchella.
Coleus Verschaffeltii.
Convolvulus minor coeruleus.
Cosmos Crimson King, Rose Queen.
Cuphea platycentra.
Dahlia Cactus, Collerette, Fancy, Paeony-flowered, Single Cactus, and Single sections. Hosts of named varieties. Unless dwarf Star Dahlias are used the above sections will have to be put at the back of the borders.
Delphinium Azure Fairy, Blue Butterfly, Cardiopetalum, chinense, and formosum.
Dianthus chinensis, Heddiwegii, and laciniatus.
Diascia Barberae.
Dimorphotheca aurantiaca hybrida (Golden Star of the Velde).
Echeveria, all varieties.
Eschscholzia crocea, Douglasii, and Mandarin.
Fuchsia (for specimens), any good greenhouse variety.
Gaillardia amblyodon, picta Lorenziana, etc.
Gaura Lindheimeri.
Geranium (Zonal Pelargonium), Happy Thought, Henry Jacobey, Mrs Pollock, Paul Crampell, etc. etc.
Gerbera Jamesoni (Barberton Daisy).
Godetia Bijou, Duchess of Albany, Gloriosa, Lady Albemarle, Lord Roberts, Rosamund, Schamini, White Pearl, Whitneyi, etc. etc.
Golden Feather (*Pyrethrum aureum*).
Helichrysum monstrosum, nanum, setosum (various beautifully attractive colours).

Heliotropium peruvianum, Regale Margaritæ.
Herniaria hirsuta.
Ice Plant (*Mesembryanthemum*).
Jacobaea (*Senecio elegans*), Double Crimson and Double Purple.
Lantana hybrida.
Larkspur Hyacinth and Ranunculus-flowered.
Leptosyne maritima, Stillmannii.
Lobelia cardinalis, Erinus vars, erecta pumila splendens, hybrida, tenuior, etc. Many named sorts.
Lupinus nanus and subcarnosus.
Marigold, African, French, named varieties.
Marvel of Peru (*Mirabilis*).
Matricaria eximia Golden Ball, and Silver Ball.
Melianthus major.
Mesembryanthemum tricolor.
Mignonette (all varieties).
Mimulus cupreus, cardinalis, albus, tigrinus, etc.
Nasturtium Tom Thumb, Aurora, King of Tom Thumbs, King Theodore, Ruby King, Golden King, H. M. Stanley, etc.
Nemesia Blue Gem, Dobbie's Triumph, and strumosa Suttonii.
Nicotiana affinis and Sanderæ.
Nierembergia frutescens and gracilis.
Nigella damascena, and hispanica atropurpurea.
Œnothera bistorta, macrocarpa, and mexicana.
Pansy, all Bedding Strains, such as Fairy Queen, etc.
Pentstemon, every variety.
Perilla nankinensis.
Petunia Dobbie's Superb Double and many others.
Phlox Drummondii grandiflora and compacta in separate colours (many sorts).
Portulaca grandiflora, single and double.
Prince's Feather (*Amarantus hypochondriacus*).
Pyrethrum aureum (Golden Feather), selaginoides.
Rhodanthe maculatum, Manglesii.
Salpiglossis grandiflora.
Salvia coccinea splendens, farinacea, patens, splendens, Pride of Zurich.
Saponaria calabrica rosea.
Scabious atropurpurea, aurantiaca, minor aurea, and sulphurea.
Schizanthus grandiflorus, pinnatus, retusus, Wisetonensis, etc.
Senecio (under Jacobaea).
Silene pendula compacta, and Fortunei.
Statice Bonduelli.
Stock East Lothian, Dwarf Bedding, Intermediate, Mammoth Ten Week, Perpetual-flowering, Pyramidal, and Large-flowered sections. Many named varieties.
Sunflower Dwarf Miniature.
Sweet Sultan (*Centaurea moschata* and *suaveolens*).
Tagetes signata pumila.
Torenia Baillonii, and Fournieri.
Trachelium caeruleum and c. album.
Verbena Defiance, erinoides, erecta compacta, Helen Willmott, lemon-scented, venosa (hybrid forms very beautiful).
Viola Maggie Mott, J. B. Riding, Mauve Queen, Fred Wilkins, and many others.
Zinnia elegans, single and double.

SPRING OR WINTER BEDDING PLANTS.

Adonis vernalis.
Alyssum saxatile compactum.
Arabis albida or alpina flora plena.
Aubrietia deltoidea Dr Mules, etc.
Bulbs, all spring flowering genera.
Canterbury Bells, Calycanthema, double and single.
Cerastium Biebersteinii.
Daisies Double (*Bellis perennis*).
Helleborus niger (Christmas Rose).
Myosotis alpestris, etc.
Polyanthus Munstead variety, etc.
Stock, Brompton varieties.
Sweet William, Auricula Eyed, Pink Beauty, etc.
Viola cornuta atropurpurea, named varieties.
Wallflower, single and double. Numerous beautiful sorts.—E.

BEDDING, ROSES FOR.—See Roses for Bedding in *ROSES FOR ALL PURPOSES.*

BEDDING SCHEMES : For Summer and Winter.—Experienced gardeners are quite able to plan their own bedding schemes, but amateurs and beginners often find considerable difficulty in planning out schemes of floral beauty, hence the suggestions which are given below.

Summer Schemes.—One of the prettiest beds that we have ever seen consisted of *Centaurea candidissima* and *Geranium Mrs Quilter*. This last plant has bronze and yellow foliage with pretty red flowers. As dot plants for this bed, hybrids of *Fuchsia triphylla*, such as *Andenken au H. Henkel*, may be used with great effect, their pretty salmon-red flowers harmonising with the Geraniums. A double row of a light blue variety of Lobelia, such as *Blue Stone*, makes an effective edging.

Another useful bedding scheme is easily planned by using *Geranium Maxime Kovalesky* with pretty orange flowers. These plants are intermixed with *Chrysanthemum inordorum Snowball*. Dot plants of *Grevillea robusta* and an edging of *Alyssum Little Dorrit* complete a pleasing scheme.

A very bright bed will be obtained if crimson-scarlet tuberous Begonias of such variety as *Lafayette* are used with a groundwork of *Mesembryanthemum cordifolium variegatum.* A useful subject for dotting about in this bed is found in *Glyceria spectabilis*, which, although a water plant, grows well in beds. An edging of a blue Lobelia, such as *Mrs Clibran* or *Barnard's Perpetual*, will finish off this bed.

Another nice bed may be made as follows :—

First of all dot the bed over with any good dark flowered variety of Fuchsia such as *Charming*, then plant thinly with *Geranium Verona*, for its pleasing yellow foliage and pink flowers are most attractive, and finally make up the groundwork of *Viola Diana*, edging the bed with the crimson-flowered variety of *Begonia semperflorens.*

Another delightful bed may easily be made by planting the pink-flowered variety of *Begonia semperflorens* (*Fairy Queen*), in conjunction with the dark-leaved Cannas. *Centaurea candidissima* and *Geranium Mrs Quilter* may be used as a groundwork ; and as dot plants *Leucophyton Brownii* grown as pyramids will be useful. This bed may well be edged with the pretty *Geranium Dandy.*

A simpler bed may be made by planting *Geranium Paul Crampell* in conjunction with *Abutilon Thompsonii*, this bed being edged with *Alyssum Little Dorrit.*

Another satisfactory bed is easily made by planting scarlet tuberous Begonias and dotting plants of *Gnaphalium minimum* over the surface. A thick groundwork should be made of *Mesembryanthemum cordifolium variegatum*, and the border edged with a blue Lobelia such as *Crystal Palace Compacta.*

A bed with very distinct charm and somewhat unusual is made by intermixing *Salvia Bluebeard* with a yellow Calceolaria such as *Golden Gem* or *Golden Glory.* The bed may then be edged with *Viola Blue Bell.*

For a very large bed, a splendid lasting effect may be obtained by covering the ground thickly with a good yellow variety of *Tom Thumb Nasturtium* interspersed with dark-foliaged Cannas or *Zea japonica quadricolor perfecta.*

Winter Schemes.—For winter or spring bedding good effects may be obtained generally by the use of Hyacinths, Narcissi, Tulips, and other bulbs, with a carpeting of Double Daisies, or with the early flowering varieties of *Myosotis alpestris*, such as *Queen Victoria* or *Royal Blue.* Other splendid plants for spring bedding are found in the single, double, and variegated Arabis, Violas, Wallflowers, Polyanthus, and *Aubrietia deltoidea Dr Mules.* To lighten up the appearance of beds good use may be made of small shrubs such as Cupressus and Retinospora, as well as the green or variegated forms of Euonymus. If the shrubs are placed in pots there will be little danger of loss through taking them up, after they have fulfilled their purpose in the beds.

As regards particular beds the

following suggestions may be useful :—

Pink Tulips of any good variety, such as *Cottage Maid* or *Pink Beauty*, planted in a bed which is edged with light blue Violas, such as *John Quarton*, and a groundwork planted thereon of *Arabis albida flora plena*, is a pleasing combination.

Another useful bed is made up by planting yellow Tulips, such as *Chrysolora*, with a groundwork of *Aubrietia Dr Mules*, or an equally delightful bed may be made by planting scarlet tulips of such sorts as *Artus* or *Vermilion Brilliant* with a groundwork of single or double Arabis.

A further bulb bed may be made by planting *Hyacinth Charles Dickens* in a groundwork composed of a good yellow Polyanthus.

Narcissi are very useful for many spring bedding schemes. For instance, *Narcissus Emperor* interspersed with a dark Polyanthus, such as *Crimson King*, makes a most charming bed; *Narcissus Golden Spur* with a carpeting of *Myosotis Royal Blue* is equally delightful, while *Narcissus Emperor*, or indeed any large trumpet sort interspersed with the Grape Hyacinth (*Muscari botryoides*), planted in a groundwork composed of *Arabis albida variegata*, makes an unusually charming and natural bed.

May-flowering and Darwin Tulips are useful for winter and spring bedding schemes. For instance, *Tulip Pride of Haarlem* planted amongst *Wallflower Cloth of Gold* is delightful, while *Tulip retroflexa* interspersed amongst *Wallflower Vulcan* makes a really grand sight. A very nice bed is obtained by planting the early flowering *Tulip Belle Alliance* intermixed with Jonquils, and with a carpeting composed of any good pale blue Viola such as *Blue Stone* or *Diana*.

It will be seen that the different combinations possible to obtain in the arrangement of plants used for bedding are almost inexhaustible; obviously, however, of first importance is to have the plants well grown before they are put into their flowering quarters, and immediate effects should be aimed at since the seasons are much too short to have to wait long for results.—H. A.

BEDDING STOCKS.—See *STOCKS*.

BEDDING VIOLAS.—See *VIOLA*.

BEDS: SHAPE AND CHARACTER OF.

In the flower garden the most useful beds are either oblong or circular in shape, elaborate geometrical designs consisting of acute or obtuse angled figures being difficult to negotiate with the mowing machine, and except in very large gardens or in close proximity to the mansion where they can be made to enter into the architectural features of the building are quite out of favour with modern tastes. Oblong rectangular, or even square beds are permissible where they run parallel to a straight path, or when they are closely connected with the house or some other building such as a greenhouse, etc. Beds composed of gracefully curved or serpentine lines, alternating with circular or elliptical figures, are best suited to combine with paths or with portions of the lawn or garden having a similar outline. When arranging a scheme of beds preference should always be given to a simple design, selecting the position from the point of view of displaying the flowers to the best advantage, so that they can be seen from the principal windows, while, of course, considering the welfare of the plants by taking care to secure a position that is exposed to the sun, protected from the cold winds, and yet which gives a certain amount of privacy.

The soil for flower-beds should be deeply worked, liberally manured each time it is planted, trenched at least once in three years and well drained. The best flower-beds are made by taking the soil out to a depth of 2–3 ft., breaking the bottom up, and placing thereon 4–6 ins. of broken brick or other coarse material, finally filling up the bed with loam, or if the top spit should be of fair quality and texture, this may be mixed with sufficient new loam to make up the bed.

Beds are planted for both spring and summer effects. In the past bulbs have been largely used for spring effect, chiefly Crocuses, Hyacinths, Narcissi, and Tulips. These should be planted as soon as they come to hand, the beds having been well dug and manured after having been cleared of their summer occupants. The best effects are produced by first of all carpeting the beds with hardy plants, *e.g.* Arabis, Aubrietia, Myosotis, Polyanthus, also Double Daisies and Wallflowers; the latter, of course, being only suitable for carpeting the beds of some of the taller-growing Tulips.

The increased cost of bulbs is likely to restrict their use for bedding, and quite good effects may be produced by relying entirely on the hardy plants previously referred to. Their arrangement in the beds is a matter of taste, some preferring a colour scheme, others preferring a mixture. Wallflowers certainly look well when mixed, and good strains are available. Beds planted with these and edged with *Myosotis Royal Blue* or *Polyanthus Munstead Strain* leave nothing to be desired, and certainly look more natural and pleasing to the eye than splashes of each particular colour, or ribbon bands.

Summer bedding, that is, the summer planting of these beds, embraces Carpet Bedding, Sub-tropical Bedding, and Ordinary Summer Bedding.

Carpet Bedding.—This, years ago, was widely practised, and even now is of sufficient importance to warrant our publishing a special article upon it. Tastes differ, of course, as to its merits or otherwise, but it is clearly declining in popularity.

Sub-tropical Bedding.—This, to be effective, involves the use of many exotic species of plants, such as Palms in variety, Tree Ferns, Musas, Dracænas, etc., all of which require accommodation in heated greenhouses during the winter. The fuel question will rule out many of these subjects; so that this style of bedding will necessitate relying more on such subjects as *Bocconia cordata*, *Buphthalmum speciosum*, Funkia, Gunnera, Heracleum, Pampas Grass, Rheum, etc., while, from seed sown in the spring on hotbeds, Castor Oil Plants, Tobacco Plants, and Zea (Maize), as well as Beet, *Eucalyptus globulus*, Perilla, and some of the stronger-growing Solanums, may be made good use of.

Ordinary Summer Bedding.—This style is much more largely practised than any other. Some popular plants used for this purpose are Abutilon, Ageratum, Begonia, Celosia, Coleus, Fuchsia, Heliotrope, Lantana, Lobelia, Marguerite, Pelargonium, Plumbago, etc., all of which require to be wintered in heated structures, even if only stock plants are to be kept from which to procure cuttings in the spring, while when large beds are to be planted it has been the custom to grow specimen plants, both in bush, standard, and pyramid form, and use them year after year, giving them greenhouse accommodation during the winter. The tendency now is to rely more and more on the hardier flowers, such as Antirrhinums, which make quite a good display in the flower-beds. Asters, Clarkias, Godetias, *Nemesia Suttoni*, and Stocks, treated as half-hardy annuals are excellent. Sweet Peas sown in pots or boxes in February and planted in April are excellent for furnishing a display in large beds. Pentstemons in such varieties as *George Home*, *Mrs Coats*, and *Mrs Hutton* will flower from June to October if planted in beds that have been well worked and liberally manured. If the beds are hoed frequently they will not require watering. Chrysanthemums of the early flowering class will provide a magnificent display in the autumn, the healthiest roots being, of course, lifted after flowering, and wintered in a cold frame to provide cuttings from which to raise young plants in the spring. Violas in variety will flower continuously throughout the summer if the seed pods are removed weekly. All the above hardy flowers can be raised annually either from seed or cuttings without fire heat; they therefore constitute the most useful subjects for furnishing the flower-beds of the future.

For further notes on this type of bedding see articles on *BEDDING OUT*, *BEDDING PLANTS*, *BEDDING SCHEMES FOR SUMMER AND WINTER*, etc.—T. A. S.

BEDS AND BORDERS, AREAS OF.—See AREAS OF BEDS AND BORDERS in *ARITHMETIC AND GARDENING*.

BEDSTRAW.—See *GALIUM*.

BEE NETTLE (*Galeopsis Tetrahit*).—See *GALEOPSIS*.

BEE ORCHIS (*Orchis apifera*).—See note at end of *HARDY ORCHIDS*.

BEE PLANTS, LISTS OF.

The present-day bee-keeper must grow largely those plants whose flowers are rich in nectar if he is to have the large amount of honey he desires. The following classified lists contain all the best bee plants, and will be useful to those beginners who are at a loss as to what to grow for their bees:—

Annuals.

Alyssum maritimum.
Borago officinalis.
Centaurea Cyanus, and moschata.
Clarkia pulchella.
Coreopsis tinctoria.
Cynoglossum Wallichii.
Eschscholzia californica.
Gilia tricolor.
Helianthus annuus.
Iberis coronaria.
Impatiens glandulifera.
Limnanthes Douglasii.
Nemophila insignis, and maculata.
Nigella Damascena.
Phacelia campanularia, tanacetifolia, and viscida (Syn. *Eutoca viscida*).
Reseda odorata.
Saponaria calabrica.
Schizopetalon Walkeri.
Silene pendula.
Tropaeolum majus and minus.
Whitlavia grandiflora (Syn. *Phacelia Whitlavia*).

Biennials.

Campanula Medium (Canterbury Bells).
Cheiranthus Cheiri (Single Wallflower).
Echinops sphaerocephalus.
Erysimum perofskianum (often called *Cheiranthus Allionii*).
Myosotis (all species of Forget-me-not; really perennials but generally grown as biennials).
Verbascum Thapsus.

Perennials.

Ajuga reptans.
Althaea rosea (single).
Alyssum saxatile.
Anchusa italica.
Arabis alpina (single).
Asclepias syriaca (Syn. *A. Cornuti*).
Aster (Michaelmas Daisies, all species).
Aubrietia graeca.
Campanula (most species).
Echinops Ritro.
Hedysarum coronarium.
Helleborus niger.
Malva moschata.
Polemonium caeruleum.
Polygonum sachalinense.
Primula veris, and vulgaris.
Sedum acre, anglicum, major, spectabile, and Telephium.
Spiraea Aruncus, Ulmaria.
Stachys lanata.
Symphytum asperrimum.

Verbascum phoeniceum.
Veronica Teucrium.
Vinca minor.
Viola odorata and tricolor.

Hardy Shrubs.

Berberis (most species).
Calluna vulgaris (Common Ling).
Deutzia crenata and gracilis.
Erica carnea, and cinerea.
Lonicera Caprifolium and tartarica.
Ribes sanguineum.
Robinia pseudacacia (small tree).
Symphoricarpus racemosus.

Bulbous and Tuberous Plants.

Colchicum autumnale.
Crocus vernus.
Eranthis hyemalis (Winter Aconite).
Fritillaria Imperialis.
Scilla sibirica.

L. B.-W.

BEE-TREE (*Tilia heterophylla*).—See *TREES*.

BEECH FERN (*Polypodium Phegopteris*).—See *FERNS AND FERN GARDENING*.

BEECH ROOT ROT.—See *DISEASES OF PLANTS*.

BEECH WHEAT (*Fagopyrum cymosum*).—See *FAGOPYRUM*.

BEEFSTEAK FUNGUS.—See OAK-TONGUE under EDIBLE FUNGI in *FUNGI: EDIBLE AND HARMFUL*.

BEES IN THE GARDEN.

One hundred years ago the little brown bees and their straw skeps were essential features in the gardens of both cottager and squire. To-day the reverse holds good, and owing to a variety of causes the bees and their hives are conspicuous as a rule by their absence, and we are the poorer for it. Gone in great measure is our delicious native honey, and with it went, although only few are aware of it, a good percentage of our fruit crop.

As a fertilising agent among fruit blossom the bee has no equal, and its value in this capacity exceeds even its value as a producer of honey. The grower of fruit should be a bee-keeper, for without their aid he will certainly not get full crops, while any honey he secures will rank as clear profit.

"Bees in the garden" is not always a synonym of "honey in the cupboard," but it should be, for it is largely a matter of a little intelligent attention at important times. The requisite knowledge is easily gained, and the sum total of all the time needed for the care of a small apiary would only amount to a few hours for the whole of the year.

It is best on the whole for beginners to commence with swarms obtained as early in the season as may be and hived in new frame hives. The hives should be placed in a secluded part of the garden, preferably with a southerly aspect. It will be all for the best if they back up to a path, for there will then be no need of walking upon cultivated ground during manipulations. The ground around the hives should be kept clear of weeds and tall-growing crops, while at the same time a little overhead shade will be beneficial in hot weather.

By commencing with swarms, new hives and appliances, there is much less danger of contracting bee disease, which unfortunately exists in many localities. Speaking of appliances, a smoker, veil, and graduated bottle-feeder are all that will be needed for the first year, if a sound text-book be excepted. During the first season it is not usual to secure much honey from swarms, but sound colonies are formed which are good for useful work in future years.

In a small apiary the bees require little attention from May to September. The super cases used for honey are put in position and added to as the need arises. Beyond that little is required unless a swarm should issue. This is often caused by overcrowding in the hive, and most frequently occurs in June, sometimes in the latter part of May, and rarely later than the early part of July. The hiving of a swarm is a formidable proposition to the novice, but there is nothing at all terrible about it. Never are bees more harmless than at that time, and stinging is the last thing they think about.

In average districts good colonies should produce fifty or sixty pounds of surplus honey per annum, but this would be a low estimate in some localities. The writer has taken from 150–200 lb. from single colonies in exceptionally good years.

Bees should be fed and prepared for winter in September, and if this is properly done no further attention should be necessary until April. During this period the bees are more or less semi-dormant, and any interference is to their detriment.

The fear of stings is a bar to the

keeping of bees in many gardens, but it is an exaggerated evil. Bees do not sting as a rule for the love of inflicting pain, but only when in their opinion danger threatens. If the hives stand in a quiet part of the garden a sting is a remote possibility. Bees dislike nothing so much as rush and bustle, quick nervous movements, and strong smells such as the bruising of onions, etc., in their vicinity. These little weaknesses on their part are so trivial as to warrant no one in refusing them admittance, while the good work they do for their owner is rarely credited at the full value.

Some bees are much quieter than others, but if it be found that a colony is of an irritable disposition, there is an easy remedy in re-queening it from a quieter strain.—H. G.

[When the gardener is unfortunate enough to get stung it is important to remember to extract the sting. A little ammonia or blue from the blue-bag rubbed on the wound will then quickly soothe it.—EDITOR.]

BEET.—See *BEETROOT.*

BEET CARRION BEETLES. — See *INSECT PESTS.*

BEET FLY.—See *INSECT PESTS.*

BEET, SEAKALE or SILVER (*Beta Cicla.* Nat. Ord. Chenopodiaceæ).—This is distinct from Beetroot, and is grown exclusively for its huge leaves, the midrib of which, if well grown, is very broad and of great length. When these leaves are divested of all the green, which by some is used as Spinach, the midribs are boiled and treated exactly as is usual for Seakale. As this crop comes in at a different period of the year, it usually finds favour with those who highly prize the real Seakale.

The soil for this crop should be well manured; seed may be sown in April in rows 18 ins. apart, allowing from a foot to 18 ins. between the plants. It bears transplanting fairly well.—F. R. C.

Spinach Beet is dealt with in the article on *PERPETUAL SPINACH*.—EDITOR.

BEET, SUGAR.—See *SUGAR BEET.*

BEETLES (INSECT FRIENDS).—See *INSECT FRIENDS.*

BEETROOT (*Beta vulgaris.* Nat. Ord. Chenopodiaceæ).—Although too often grown only for salads, when served up by those who understand their business, Beetroot makes a most excellent vegetable, a fact appreciated on the Continent, but too little known at home. It is one of the easiest, also one of the most profitable crops to grow, needing neither a rich nor an elaborately prepared soil, nor after attention when the seed has been sown. Large size in these being rarely a recommendation, richness is unnecessary; in fact, when preparing the bed for sowing, animal manure must rigidly be avoided, or the resulting crop will be so coarse or badly forked as to be almost worthless.

Culture.—The intended bed should be deeply dug, and the soil broken up very fine as the digging proceeds, this being done in order that the long root may speedily penetrate to such a depth as will secure the plant against check from likely summer drought.

Sowings may be made from 30th March to 8th June, sowings at the latter date invariably producing roots of most acceptable size, very suitable for use as a winter vegetable. The distance between the rows depends largely upon the variety, also upon the wishes of the grower; for all ordinary purposes about 12–15 ins. between the rows, and 8–12 ins. between the plants in the row may be depended upon to give satisfactory results. Surplus plants obtained when thinning out may be transplanted into other quarters, and, providing rain soon follows, these plants may be expected to take root quickly, and in a very short time they will appear to be no worse for the shift. Any variety found among the long-growing section will give good results in any soil providing it has been deeply dug, but where land is stony and only a few inches above rock or marl, these would be useless. For all such soils preference should be given to the Globe, or turnip-rooted varieties. These make all their growth above ground, the size or shape of the bulbs being but little affected by the nature of the soil below.

It always pays the grower to purchase none but a good strain of seed; much of that offered at a low price being mere rubbish, and if cooked, scarcely different in colour or character from Mangolds as grown for sheep or cows. Lift the crop in October or early in November, and either place the roots in a clamp or pit, as many large growers do with their potatoes, or put them under cover in a root-shed in heaps. Extra fine roots can be stored between layers of soil.

Good Varieties include Blood Red, Cheltenham Green Top, Dobbie's Purple, Frisby's Excelsior, Nutting's Dwarf, and Pineapple. Among the *Globe Varieties*, Crimson Globe or Model appear to be the best.—F. R. C.

See also *ORNAMENTAL VEGETABLES.*

BEGONIA (Nat. Ord. Begoniaceæ).

This was formerly treated as a stove plant, but is now used largely for bedding purposes as a half-hardy perennial, and for conservatory decoration. It is about 12 ins. high, and enjoys a loose lumpy loamy compost, well enriched with decayed manure. Many of the species are tropical and can only be grown with success in a high temperature.

Culture.—Most of the florists' Begonias belong to the tuberous-rooted section. For bedding purposes the tubers should be started in a warm greenhouse or on a hot-bed, early in March. Shallow boxes filled with light, rich soil are convenient for this purpose, the tubers being lightly pressed into the compost, but not covered. Water should be given very sparingly till growth has started, and when the shoots are about half an inch long, the boxes may be moved to a cold house or frame, protection, however, being given against late frosts. Planting out can be safely done during the first week in June. The tubers should then be buried 2 ins. deep and the beds heavily mulched with short manure. Abundant moisture is required during summer, and shade from hot sunshine is desirable. With good culture the flowering season will last from mid-July till the advent of frost in autumn, when the tubers should be lifted and gradually dried off. They will winter safely if kept in boxes of dry soil in a frost-proof shed. For pot culture under glass the procedure is similar till growth is well started, when the tubers are potted up in 4-inch pots. The compost for this should be three parts fibrous loam, two parts leaf-mould, and one part each of decayed manure and coarse silver sand. Before becoming pot-bound the plants are given their final shift, and as they like plenty of root room, pots of 8-inch diameter are not too large for good-sized specimens. Cool culture, pinching off all early buds till thoroughly established, and abundant moisture with occasional doses of weak liquid manure, should ensure successful results.

Varieties.—Black Knight, H. W. Fry, Hon. Mrs R. Greville, Irene Tambling, John G. White, King Albert, Lady Arthur Nicholson, Lady Tweedmouth, Mrs J. D. Blackmore, Mrs Peter Blair, Old Gold, Princess Victoria Louise.—J. L. G.

UP-TO-DATE SELECTIONS.

Begonia Betha.—Double, cerise salmon.

B. Blackmore and Langdon's Double Tuberous-Rooted.—Great range of colour.

B. Corientia.—Salmon red.

B. Edith.—Semi-double pink.

B. Erfordia.—Carmine.

B. gracilis Bonfire.—Scarlet-carmine.

B. g. luminosa.—Red.

B. g. Prima Donna.—Rose.

B. H. Frankling.—Crimson.

B. Lloydii.—Semi-double.

B. Louise Arnold.—Double blush.

B. Marion Reindel.—Double, orange and pink.

B. Rex Hybrids.—Many colourings.

B. semperflorens Fairy Queen.—Pink.

B. s. Scarlet Gem.—Deep scarlet.

B. s. Coral Pink.—Pink.

B. s. Loveliness.—Rose-pink.

B. s. Matador.—Pink and carmine.

B. s. Picotee.—White, edged pink.

B. s. Vernon Tom Thumb.—Scarlet.

B. s. Exquisite.—Rose-pink.

B. s. White Queen.—White.

B. s. Winter Romance.—Salmon-scarlet.

B. Single Tuberous-Rooted Enchantment.—Yellow and rose.

B. s. T.-R. Giant Scarlet.—Orange-scarlet.

BELLADONNA.—A synonym for *ATROPA*, which see. See also *MEDICINAL HERBS*.

BELLADONNA LILY.—See *AMARYLLIS*.

BELLEVALIA.—Now included in the genus HYACINTHUS.

BELLFLOWER.—See *CAMPANULA*.

BELLIDASTRUM.—Now included in the genus *ASTER*.

BELLIS.—See *DAISY*.

BELLIUM (FALSE DAISY, Nat. Ord. Compositæ).—This genus includes several Daisy-like plants with rosettes of leaves. They are useful in the rock garden, though soon form rather large patches. They thrive in half-shady positions in gritty soil, and are propagated by division in the autumn or spring, or by seeds sown outside in the spring.

Bellium bellidioides.—This is an annual, but sows itself freely. Flowers white. Site half-shady. Soil gritty loam. Flowering Period, May to August. Height, 3 ins.

B. crassifolium.—This is a useful little perennial. Flowers yellow. Site sunny. Soil gritty loam. Flowering Period, July. Height, 6 ins.

B. minutum.—This is smaller than the above. Flowers white and yellow. Site half-shady. Soil gritty loam. Flowering Period, June to July. Height, 2 ins.

W. I.

BELLWORT.—See *CAMPANULA* and *UVULARIA*.

BENGAL QUINCE.—A name applied to the genus ÆGLE. See *SHRUBS*.

BENT GRASS (*Deschampsia flexuosa*). See *DESCHAMPSIA*.

BENT GRASS.—A perennial weed. For MEANS OF CONTROL see *WEEDS*. See also *AGROSTIS*.

BENTHAM'S STRAWBERRY TREE (*Cornus capitata*).—See *CLIMBING AND TRAILING PLANTS*.

BERBERIDOPSIS.—For the best species see *CLIMBING AND TRAILING PLANTS*.

BERBERIS.—For the best species see *SHRUBS*.

BERCHEMIA.—For the best species see *CLIMBING AND TRAILING PLANTS*.

BERGAMOT.—See *MONARDA*.

BERMUDA BUTTERCUP (*Oxalis cernua*).—See *OXALIS*.

BERMUDA EASTER LILY (*Lilium longiflorum eximium*).—See *LILIES*.

BERRIED ELDER (*Sambucus racemosa*).—See *TREES*.

BERTEROA.—Now included in the genus *ALYSSUM*.

BERYLLIS.—Now included in the genus ORNITHOGALUM.

BETONICA.—Now included in the genus *STACHYS*.

BETULA.—For best species see *TREES*.

BHOTAN PINE (*Pinus excelsa*).—See *TREES*.

BIENNIALS : Notes on.

There is no hard-and-fast line between an annual, a biennial, and a perennial. Annuals, that are sown in autumn, or sow themselves, will live through the winter and bloom like biennials. Seeds of the biennial Evening Primrose that lie in the soil all winter may germinate and reach the flowering stage late the following summer. Wallflowers and Sweet Williams are perennials, but give the best results when grown as biennials. The biennial *Gilia coronopifolia* does best sown early in heat and grown as an annual, and so of many others. Those who have the command of a heated greenhouse or make a hotbed can rear many things in this way, and plant them out when the weather becomes suitably genial. Other things can be reared in a cold frame, such as the Indian Pink (*Dianthus chinensis*), and bloomed outside in July and August. In inland districts, those who have no artificial heat can sow East Lothian and Brompton Stocks in July and preserve them in a cold frame till March or April, according to the weather; those on the sea-board can sow them at that time where they are to bloom, or transplant them. While biennials may be sown in May, June, or July, those who have not even a cold frame should select the earliest month to sow outdoors to enable the plants to grow to good flowering size. Wallflowers bloom in May, and must be sown during that month in the open air. If sowing is delayed until July the plants sometimes fail to reach flowering size the following year.

List of Biennials.—The following list contains those plants usually termed Biennials by gardeners. With the exception of *Ammobium alatum grandiflorum*, *Anagallis fruticosa*, *Anarrhinum bellidifolium*, *Blumenbachia coronata*, *Gilia aggregata* and *G. coronopifolia*, all are hardy.

Althaea caribæa.
Ammobium alatum grandiflorum.
Anagallis fruticosa.
Anarrhinum bellidifolium.
Anchusa capensis.
Bigelow's Aster (*Aster Bigelovii*).
Blumenbachia coronata.
Bromus brizaeformis.
Bellflowers (*Campanula sibirica*, *C. s. divergens*, *C. thyrsoïdes*).
Canterbury Bells (*Campanula Medium*).
Centaurea Fenzlii.
Chimney Bellflower (*Campanula pyramidalis*).
Chlora grandiflora.
Cretan Mullein (*Celsia cretica*).
Echinospermum marginatum macranthum.
Evening Primrose (*Œnothera biennis*, *Œ. lamarckiana*).
Foeniculum dulce.
Forget-me-not (*Myosotis alpestris*).
Foxglove (*Digitalis purpurea*).
Gilia aggregata, G. coronopifolia.
Grindelia grandiflora.
Hollyhock (*Althaea rosea*).
Honesty (*Lunaria biennis*).
Horned Poppy (*Glaucium flavum*, *G. f. fulvum*, *G. f. tricolor*).
Indian Pinks (*Dianthus chinensis*).
Meconopsis nepalensis.
Michauxia lævigata.
Mullein (*Verbascum olympicum*, *V. phlomoides*, *V. phoeniceum*).
Night Scented Stock (*Hesperis tristis*).
Salvia bicolor.
Stock (*Brompton*, *East Lothian*, *Queen*).
Sweet Rocket (*Hesperis grandiflora*).
Sweet Scabious (*Scabiosa atropurpurea*).
Sweet William (*Dianthus barbatus*).
Variegated Tree Mallow (*Lavatera arborea variegata*).
Wallflowers (*Cheiranthus Cheiri*).

J. F.

[Descriptions of many of these plants will be found under their English or their botanical names throughout the work.—EDITOR.]

BIFRENARIA.—See *ORCHIDS.*

BIG BUD.—See *INSECT PESTS.*

BIG RIVER ABUTILON (*Abutilon megapotamicum*). — See *CLIMBING AND TRAILING PLANTS.*

BIG SHELL-BARK (*Carya sulcata*).—See *TREES.*

BIGELOW'S ASTER (*Aster Bigelovii.* Nat. Ord. Compositæ).—We give this plant a paragraph to itself as it is the only biennial Aster which is worth growing. There is no difficulty in its culture, a stock of plants being easily raised by sowing seeds in a small bed during May and transplanting the seedlings into sunny positions, in well-drained soil, where they are to remain. The flowers are lilac, with a yellow centre, 2½ ins. across; they are produced in flat-topped trusses, and are very handsome. The blooming period is throughout the summer, and the plant averages 2½ ft. in height.—J. F.

BIGNONIA.—In part a synonym for *TECOMA*, which see. For CLIMBING SPECIES see *CLIMBING AND TRAILING PLANTS.*

BILBERRY (*Vaccinium Myrtillus*).—See *SHRUBS.*

BILL-HOOKS.—See *GARDEN TOOLS.*

BINDING PLASTER.—See *MORTAR.*

BINDWEED.—See *CONVOLVULUS.*

BINDWEED (*Convolvulus arvensis*).—A strong growing perennial weed. For MEANS OF CONTROL see *WEEDS.*

BINDWEED, BLACK (*Polygonum Convolvulus*).—An annual climbing weed. See *WEEDS.*

BIOTA.—Now included in the genus *ASTER.*

BIRCH.—See the genus BETULA in *TREES.*

BIRD CHERRY (*Prunus Padus*).—See *TREES.*

BIRD'S-EYE PRIMROSE (*Primula farinosa*).—See *PRIMULA.*

BIRD'S-FOOT.—See *ORNITHOPUS.*

BIRD'S-FOOT TREFOIL.—See *LOTUS.*

BIRD'S TONGUE (*Senecio paludosus*). See *SENECIO.*

BIRDS AND THE GARDEN.

We are perhaps apt to notice the relative amount of harm more than the good done by these beautiful and cheery inhabitants and visitors of our gardens, therefore we should judge the various kinds fairly, by means of careful observation.

Many of the wilder and more timid birds hardly ever enter a garden, especially if there is a house near; cats also scare birds. *Owls* and *Hawks*, "Nature's mouse-traps," will very rarely be seen unless the garden is near a wood. The locality and position of the garden influence its bird visitors. In many gardens the handsome ***Bullfinch*** is never seen, whereas in other gardens, perhaps near a wood, they may be most destructive to gooseberries, and plums (especially greengages), by pecking out the buds, in consequence of which nearly the entire crop of fruit is lost and the symmetry of the bushes and trees is spoilt through loss of leaf. The same may be said of the *Hawfinch*, a fine and rare bird, except in certain localities, where it eats peas at a great pace, also cherries and bullaces; it pecks apples and pears to get at their pips, and attacks plum and pear buds. The ***Jay*** in like manner comes from the woods, and though a sad thief of green peas, cherries and other fruit, it is useful to the garden in eating cockchafer-beetles, and other insects, also blackbirds' eggs, as there are generally too many blackbirds for the good of the fruit of the garden.

Rooks and *Seagulls* hardly ever enter the garden, and the *Jackdaw* seldom, but it may clear cherries or walnuts from an orchard; in the field they destroy newly-sown peas and grain, yet are useful if not too numerous, as they eat leather-jackets, wireworms, and cockchafer grubs, but they will completely clear nests of small birds of both eggs and young.

The *Magpie* is a rare bird in many districts; it goes for cherries like the rook, to which it is allied, but like owls and hawks should never be destroyed.

The *Plover* is another bird common in fields, but seldom seen in the garden; it is a valuable bird to the cultivator of land, and does no harm.

Coming now to the birds which most frequent our gardens, of these the *House Sparrow* is the commonest; it is very hardy, and is so daring that it finds food in winter where other birds fear to approach; its rate of multiplication also is great compared with other birds, which from a garden point of view seem to be more useful. The house sparrow in feeding its young does take a certain number of caterpillars and other insects, but as soon as the feathers of the young birds are grown, they are fed on grain, seeds being the staple food of the mature bird. Professor F. V. Theobald tells me House Sparrows and other finches eat great numbers of the caterpillars of the winter moth (which defoliate fruit trees), and that the sparrow eats all kinds of caterpillars except the hairy ones, which are only eaten by that interesting bird, the *Cuckoo.* In gardens the House Sparrow interferes severely with new-sown seed and young pea shoots; in the winter and early spring it pecks the buds of gooseberries and red currants, and sometimes those of plums, damsons, and cherries. It pulls to pieces the flowers of some varieties of cherries and plums, perhaps for the sweet juice, but apparently for mischief. It sometimes eats caterpillars on fruit trees, aphides on damsons, weevils on peas, and occasionally a white cabbage butterfly, but the general opinion is that the good it does in a garden even at a most liberal estimate is far out-balanced by destructiveness. The late Miss E. A. Ormerod, one of the wisest and kindest of economic naturalists, considered House Sparrows to be too numerous for the good of both farm and garden.

The *Blackbird* is the worst thief of fruits, including green and ripe strawberries, red currants, gooseberries, raspberries, apples, cherries, plums, tomatoes, mulberries, figs, and loganberries. When not eating fruit, it feeds on worms, slugs, and insects; these birds are considered to be increasing in number.

The *Starling* is very destructive to cherries, strawberries, pears, apples, plums, raspberries, gooseberries, and currants; this bird also appears to be increasing rapidly. It is a valuable insect destroyer on pasture land, foraging among the grass for leather-jackets (larvæ of the Crane-fly) and wireworms.

The sociable little *Robin Redbreast* feeds chiefly on worms, insects, and ground grubs, but it also takes a few red and white currants, cherries, strawberries, and grapes under glass, taking a peck at each fruit, thus doing considerable harm in a short time.

The *Song Thrush* destroys large quantities of strawberries, cherries, red currants, and raspberries, but does not, like the blackbird, peck apples and plums on the trees; its damage is worst in dry summers and autumns, when its natural food consisting of worms, snails, grubs, and slugs is hard to get; it is useful in winter.

The *Missel Thrush* is among the worst fruit thieves, a voracious eater of cherries, also pears, apples, plums, damsons, red currants, ripe gooseberries, strawberries, and raspberries, yew, holly, and mountain ash berries; it is fond of black currants, which most birds avoid. Except in fruit time it is a very useful bird.

The *Chaffinch* attacks plum and pear buds, and bites off many plum blooms presumably to get nectar; in company with the House Sparrow it pecks gooseberry buds, destroys garden seedlings, but eats many caterpillars, also aphides. The *Greenfinch* is in habit very similar to the chaffinch, except that it eats very few insects and is if anything more destructive to sprouting crops; it eats weed seeds, and thereby distributes certain weeds; it eats the seed from turnip, cabbage, and radish plants, and the buds of pear, plum, and gooseberry.

The *Wood Pigeon* is a plague, and is said to do no good; it is a very greedy feeder, destroying cabbage and turnip leaves in winter; it roots up seeds such as beans and corn, eats green gooseberries in quantities, also clover leaves. This bird should be ruthlessly destroyed and made into pies.

The *Lark* is destructive to peas when coming up; in a hard winter it strips autumn-planted cabbage, Brussels sprouts, also spinach. It pecks early strawberries. When not engaged as above, it is probably doing good.

Martins, *Swallows*, and *Swifts.*—These rapid fliers whilst in flight catch winged aphides, moths, and other flying insects, and are therefore very useful.

The gentle *Hedge Sparrow* is said to do "All good and no harm."

The *Pied Wagtail* is good in every way, eating insects and small molluscs.

The *Brown Linnet* is destructive

to cabbage, radish, and all other seed.

The *Blue Tit* is a great feeder on insects, many of which are injurious; mussel scale on the trunks of apple trees is largely eaten by tits, also scale on gooseberry, black and red currants. The Blue Tit, however, pecks holes in a good many apples, pears, plums, also in grapes in a vinery.

The *Wren* is strictly insectivorous, constantly picking up insects and their eggs on the branches of trees, and does no harm.

The *Cuckoo*.—"Let him be, he lives a useful life." It eats immense quantities of caterpillars during its brief stay in parts of this country before its return to Africa.

The *Blackcap* eats all manner of insects, also raspberries, cherries, and figs.

The *Whitethroat* and other *Warblers* eat raspberries, sweet cherries, grapes, and figs when ripe; otherwise they are insectivorous.

The *Spotted Flycatcher* is wholly beneficial, destroying insects, including aphides and the gooseberry sawfly.

The *Tree Creeper* is harmless and a good insect destroyer.

The *Nuthatch* is beneficial, only taking a few filberts and cobnuts.

Undoubtedly birds eat a great many injurious insects, but several of the most troublesome are little if at all eaten by birds; such are the Big Bud Mite of black currants, Woolly Aphis on apple trees, the larvæ of the Gooseberry Sawfly and Magpie Moth.

Although some kinds of birds eat great quantities of aphis and apple sucker, spraying is more effective where it is possible. Gooseberry bushes may be protected to some extent from birds pecking out the buds by limewash spraying; plum trees may be similarly treated, but a strong pump is necessary in order to apply the lime sufficiently thickly. As a result of the experience of generations of observant gardeners, and the more recent study of the life-histories of insects by economic naturalists, most of the garden pests may be got rid of by means of spraying with insecticides.—C. H. H.

BIRTH-ROOT (*Trillium erectum*).—See *TRILLIUM*.

BISHOP'S MITRE GOURD.—See *ORNAMENTAL GOURDS*.

BISHOP'S PINE (*Pinus muricata*).—See *TREES*.

BISTORT.—See *MEDICINAL HERBS*.

BITING STONECROP (*Sedum acre*).—See *SEDUM*.

BITTER ALMOND (*Prunus Amygdalus amara*).—See *TREES*.

BITTER CANDYTUFT (*Iberis amara*). See *CANDYTUFT*.

BITTER CRESS.—See *CARDAMINE* and *CRESS*.

BITTER-NUT (*Carya amara*).—See *TREES*.

BITTER PECAN (*Carya aquatica*).—See *TREES*.

BITTER PIT.—See *APPLE DISEASES*.

BITTER-ROOT.—See *LEWISIA*.

BITTER-SWEET (*Solanum Dulcamara*).—See *SOLANUM*.

BITTER SWEET (*Celastrus scandens*). See *CLIMBING AND TRAILING PLANTS*.

BITTER VETCH (*Vicia Orobus*).—See *VICIA*.

BITTERWORT.—A name applied to *Gentiana lutea*. See *GENTIANA*.

BLACK ALDER (*Ilex verticillata*).—See *HOLLY*.

BLACK APRICOT (*Prunus dasycarpa*). See *TREES*.

BLACK ARMY.—See under BEAN APHIS in *INSECT PESTS*.

BLACK ASH (*Fraxinus nigra*).—See *TREES*.

BLACK BEARBERRY (*Arctostaphylos alpina*).—See *SHRUBS*.

BLACK BINDWEED (*Polygonum Convolvulus*).—An annual climbing weed. See *POLYGONUM*. For MEANS OF CONTROL see *WEEDS*.

BLACK BIRCH (*Betula occidentalis*).—See *TREES*.

BLACK BULLACE (*Prunus insititia*).—See *TREES*.

BLACK COTTONWOOD (*Populus trichocarpa*).—See *TREES*.

BLACK CUMIN (*Nigella sativa*).—See *LOVE-IN-A-MIST*.

BLACK CURRANT (*Ribes nigrum*).—See *BUSH FRUITS*, also under RIBES in *SHRUBS*.

BLACK CURRANT RUST.—See *DISEASES OF PLANTS*.

BLACK-EYED SUSAN (*Rudbeckia speciosa*).—See *RUDBECKIA*.

BLACK FLY.—See under BEAN APHIS in *INSECT PESTS*.

BLACK FOX-TAIL GRASS (*Alopecurus agrestis*).—See *ALOPECURUS*.

BLACK HAW (*Viburnum prunifolium*). See *SHRUBS*.

BLACK HELLEBORE (*Helleborus niger*).—See *HELLEBORUS*.

BLACK HOREHOUND (*Ballota nigra*). See *BALLOTA*.

BLACK IRISH ELM (*Ulmus montana nigra*).—See *TREES*.

BLACK JACK (*Quercus marilandica*). See *TREES*.

BLACK KNAPWEED (*Centaurea nigra*). See *CENTAUREA*.

BLACK LARCH (*Larix pendula*).—See *TREES*.

BLACK LEG.—See *POTATO DISEASES*.

BLACK MAIDENHAIR SPLEENWORT (*Asplenium Adiantum-nigrum*).—See *FERNS AND FERN GARDENING*.

BLACK MASTERWORT (*Astrantia major*).—See *ASTRANTIA*.

BLACK MEDICK (*Medicago lupulina*). See *MEDICAGO*.

BLACK MULBERRY (*Morus nigra*).—See *TREES*.

BLACK NIGHTSHADE (*Solanum nigrum*).—A poisonous weed abundant in many gardens. See *SOLANUM*. For MEANS OF CONTROL see *WEEDS*.

BLACK ROT OF CABBAGE.—See *DISEASES OF PLANTS*.

BLACK SCAB.—See WART DISEASE OF POTATOES in *POTATO DISEASES*.

BLACK SPECK.—See *POTATO DISEASES*.

BLACK SPOT ON ROSES.—See *ROSE DISEASES*.

BLACK SPRUCE (*Picea nigra*).—See *TREES*.

BLACK STEM ROT.—See *POTATO DISEASES*.

BLACK-STEMMED SPLEENWORT (*Asplenium Trichomanes*).—See *FERNS AND FERN GARDENING*.

BLACK STRIPE.—See TOMATO STRIPE in *DISEASES OF PLANTS*.

BLACK WALNUT (*Juglans nigra*).—See *TREES*.

BLACK WILLOW (*Salix nigra*).—See *TREES*.

BLACKBERRIES.—See *BRAMBLES AND BERRIES*.

BLACKTHORN (*Prunus spinosa*).—See *TREES*.

BLADDER DOCK (*Rumex vesicarius*). See *RUMEX*.

BLADDER FERN.—The various kinds of this are referred to under CYSTOPTERIS in *FERNS AND FERN GARDENING*.

BLADDER HERB (*Physalis Alkekengi*).—See *PHYSALIS*.

BLADDER-NUT (the genus STAPHYLEA and *S. pinnata*).—See *SHRUBS*.

BLADDER SENNA.—The genus COLUTEA. See *SHRUBS*.

BLAEBERRY (*Vaccinium Myrtillus*). See *SHRUBS*.

BLANCHING.—See *VEGETABLES: BLANCHING AND FORCING*.

BLANCHING CELERY.—See *CELERY*

BLANCHING LEEKS.—See *LEEKS*

BLANJULUS.—See under MILLIPEDES in *INSECT PESTS*.

BLANKET FLOWER.—See *GAILLARDIA*.

BLANKET HERB.—A synonym for MULLEIN, which see in *MEDICINAL HERBS*.

BLASTODACNA.—See PITH MOTH in *INSECT PESTS*.

BLAZING STAR (*Liatris elegans*).—See *LIATRIS*.

BLECHNUM.—For the best species see *FERNS AND FERN GARDENING*.

BLEEDING HEART.—See *DICENTRA*.

BLENNOCAMPA.—See ROSE SAWFLIES in *INSECT PESTS*.

BLESSED THISTLE.—See under HOLY THISTLE in *MEDICINAL HERBS*.

BLEWIT.—See EDIBLE FUNGI in *FUNGI*.

BLIGHT.—See *POTATO BLIGHT*.

BLIGHTUM.—Now included in the genus *CHENOPODIUM*.

BLOOD APPLE (*Pereskia aculeata*).—See *CACTI*.

BLOOD-RED PINK (*Dianthus cruentus*).—See *DIANTHUS*.

BLOODWORT (*Rumex sanguineus*).—See *RUMEX*.

BLOSSOM WILT.—See *APPLE DISEASES*.

BLUE ASH (*Fraxinus quadrangulata*). See *TREES*.

BLUE-BOTTLE.—A name applied to *CORNFLOWER*, which see. See also under CORNFLOWER in *MEDICINAL HERBS*.

BLUE CUPIDONE (*Catananche caerulea*).—See *CATANANCHE*.

BLUE DAISY (*Globularia vulgaris*).—See *GLOBULARIA*.

BLUE-EYED GRASS (*Sisyrinchium Bermudianum*).—See *SISYRINCHIUM*.

BLUE GUM (*Eucalyptus globulosus*).—See *EUCALYPTUS*.

BLUE JACK (*Quercus cinerea*).—See *TREES*.

BLUE LUPINE (*Lupinus polyphyllus caeruleus*).—See *LUPINE*.

BLUE MEADOW GRASS (*Poa compressa*).—See *POA*.

BLUE MOONWORT.—A name applied to the genus *SOLDANELLA*. See note at end of article on that genus.

BLUE MOUNTAIN DAISY (*Aster alpinus*).—See *ASTER*.

BLUE MOUNTAIN SWEET (*Ceanothus azureus*).—See *CLIMBING AND TRAILING PLANTS*.

BLUE OAK (*Quercus Douglasii*).—See *TREES*.

BLUE ROSE (*Veilchenblau*).—See under RAMBLER ROSES in *ROSE CLASSES*.

BLUE SOWTHISTLE (*Lactuca alpina*).—See *LACTUCA*.

BLUE SPRUCE (*Picea pungens glauca*).—See *TREES*.

BLUE SQUILL (*Scilla sibirica*).—See *SCILLA*.

BLUE STONE.—See COPPER SULPHATE in *COPPER AND CUPRUM COMPOUNDS* and *WEED KILLERS*.

BLUE STONECROP (*Sedum caeruleum*).—See *SEDUM*.

BLUE THROAT-WORT (*Trachelium caeruleum*).—See *TRACHELIUM*.

BLUEBELL (*Scilla festalis*).—See *SCILLA*.

BLUEBERRY (*Vaccinium corymbosum*).—See *SHRUBS*.

BLUET.—See *CORNFLOWER*.

BLUMENBACHIA (Nat. Ord. Loasaceæ).—The most important garden plant in this little family of annuals is *B. insignis*, the only one that is hardy. Seeds may be sown in early spring where the plants are to remain, or plants may be raised in gentle heat to ensure a longer season of growth. The white axillary flowers are about 1 in. across carried on rather long stems.

Blumenbachia coronata.—This half-hardy biennial species produces large glossy white flowers in June, on erect stems, about 18 ins. high, and these nestle amongst the shiny metallic leaves. Seeds may be sown in gentle heat early in March, and planted out in May to bloom during the summer; or they may be sown in a cold frame from May to July, and kept there till the weather becomes genial in May, following, and then planted out.

B. insignis (Syn. *Loasa palmata*).—This is a low climber bearing white flowers in June. Some of the hairs on its stem have a stinging character, hence it is a useful plant for a low fence and a position where unlawful hands are wont to make free with flowers and fruits to which they have no right.—C. H. C.

BLUSHER.—See EDIBLE FUNGI in *FUNGI: EDIBLE AND HARMFUL*.

BOCCONIA.—See *PLUME POPPY*.

BOG BEAN.—See *MENYANTHES*.

BOG PIMPERNEL (*Anagallis tenella*).—See *ANAGALLIS*.

BOG RUSH (*Schoenus nigricans*, Nat. Ord. Cyperaceæ).—This is a hardy plant of easy culture which may be grown in the more boggy portions of the water or wild garden. Its height averages about half a yard.

BOG VIOLET (*Pinguicula vulgaris*).—See *PINGUICULA*.

BOG AND WATER GARDEN PLANTS. See *WATER GARDEN: PLANTS FOR THE*, and under ROCK PLANTS FOR BOG AND WATER GARDENS in *ROCK PLANTS FOR ALL PURPOSES*.

BOIS DE STE. LUCIE (*Prunus Mahaleb*).—See *TREES*.

BOISDUVALIA. — Now included in the genus ŒNOTHERA.

BOLET.— See under DAINTY BOLET among EDIBLE FUNGI in *FUNGI: EDIBLE AND HARMFUL*.

BOLTONIA (FALSE STARWORT. Nat. Ord. Compositæ).—This is one of the lesser known and not largely grown hardy herbaceous perennials. However, it is well worth inclusion in borders where anything like a representative collection of hardy herbaceous plants is attempted. It will succeed well enough in any good moist garden earth, and may be used for shady shrub, and wild garden borders, or for sunny perennial parterres. It is not hard to increase it by division of the roots any time from November to March, and it may be successfully planted at any time within that period.

What to Grow. — Only three species are included, though fanciers may care about others. Of these *Boltonia asteroides* is decidedly the most desirable, as well as being the sort most often grown. There are several sorts of this, and the range of colour includes pink, purple, violet, and white. This sort blooms from July onwards into August, and may extend for a further period into September. The range of height also varies according to circumstances from 2½ ft. to 5 ft. The two other species, *B. indica* and *B. latisquama*, are white and a kind of violet-blue respectively. They bloom from late August onwards, and their height varies.—E.

BONES.

The uses of bones in the form of bone-meal, bone-dust, bone-flour, and what is known as "Half-inch Bones" are very limited, and it is exceedingly doubtful whether they do as much good as is imagined. The phosphates in these forms of bones are quite insoluble, though after a lengthy period they begin to dissolve very slowly, and beyond the fact that bone-meal and bone-dust contain a little organic matter, it is difficult to see where the fertilising value comes in. They are used freely by some people as a dressing for lawns and herbaceous borders, also for potting; but soluble phosphates would probably be very much better, and much less would have to be used.

Dissolved Bones are quite different. Most of this material is soluble in water, or in soil water, and it provides a cheap and very effective phosphatic fertiliser of which full advantage should be taken. About 1 cwt. of commercial sulphuric acid (free from arsenic) is required to dissolve 3 cwt. of bones, and the safest way of working is to make a heap out of doors on a concreted floor and surround it with coal ashes. Opinions differ as to the actual procedure, but we prefer to spray the heap of bones very thoroughly with the coldest well or spring water, and then slowly to shoot the acid out of the kegs it will arrive in, on to the bones. It is desirable to wear glasses and a sufficiently large and thick mask, also thick gloves for this work, since if a drop of the acid should jump up on to the naked hand or face a bad burn will be produced. The heap should then be covered up with large slates (the acid does not dissolve slate or glass though it dissolves all metals save lead and platinum), and left for a day. After this the whole heap is turned over on to another section of concrete flooring and mixed together. A further day for mellowing is then desirable, after which the lot is passed through a riddle and stored in stone or porcelain tubs in a dry place till required for use. There is another method, namely, that of pouring urine into a barrel of bones, but as this is decidedly smelly and none too healthy we do not describe it in detail here. Dissolved bones can be used for the same purpose and in the same quantities as superphosphate of lime.

E.

See also under PHOSPHO-NITROGENOUS MANURES in *MANURES*.

BORAGE (*Borago*. Nat. Ord. Boraginaceæ).—All members of the Borage family are hardy, and most of those in cultivation are annuals, or best treated as such. The COMMON BORAGE (*B. officinalis*) is generally relegated to the herb border, but it again came into popular favour since herb gardens have become features of many large private and public establishments. When bearing its drooping panicles of blue or purple-blue flowers in June and July, it is quite attractive and has the additional merit of being useful in such summer beverages as Claret Cup and Cool Tankard. It is quite easily raised from seeds sown in the open ground in March, but the seedlings should be thinned to 1 ft. apart. There is also a white-flowered form of this British plant listed as *B. officinalis albiflora*. Both plants should be grown freely where bees are kept; they average 1½–2 ft. high. *B. laxiflora* and *B. longifolia* are both blue-flowered species. The former is a trailer, and blooms throughout the summer, while *B. longifolia* flowers in July and August and grows about 1 ft. high.

One useful PERENNIAL SPECIES may be mentioned, namely, *Borago cretica*. This bears blue flowers in May or June, and averages 12 ins. in height.

There are a number of other species which are excluded for various reasons. The majority are little grown and are thus outside the scope of the present work.

C. H. C. & E.

BORAGO.—See *BORAGE*.

BORDEAUX MIXTURE.—See *SPRAYING MIXTURES* and *FUNGICIDES*.

BORDER CARNATION.

By this we mean the well-known Carnation grown as a border plant, as distinct from the Malmaison Carnation, the Margaret Carnation, or the Perpetual Flowering Carnation. The culture of Border Carnations is fully described in our article on *CARNATIONS*.

BORDERS, AREAS OF.—See AREAS OF BEDS AND BORDERS in *ARITHMETIC AND GARDENING*.

BORDERS, HERBACEOUS.—See the two articles on *HERBACEOUS BORDERS*.

BORDERS, MIXED. — See *MIXED BORDER, THE*.

BORECOLE, or KALE (*Brassica oleracea fimbriata*. Nat. Ord. Cruciferæ).—Owing to the extreme hardiness and general good quality of all this class they enjoy universal popularity among all lovers of fresh vegetables. Many of the best known have a decided ornamental as well as a utilitarian value, and the plants appear to do almost as well in smoky towns as in country districts.

Culture.—Seeds of any of the above may be sown from the middle of March until the first week in May. Transplanting twice is advised, the first when the plants are a few inches high, when a good open, well-manured spot should be chosen. Plant in rows 6 ins. apart, leaving

4 ins. between each plant. Give plenty of water, and plant out into permanent quarters as early in July as it is possible. Plenty of manure should be provided, and water must be given freely until the roots have taken well hold of the soil. Whenever possible allow 30 ins. apart each way, 6 ins. less where the soil is very poor or space limited.

Varieties.—The *Arctic Curled*, *Cottagers*, or *Dwarf Scotch* are probably the most popular, and these varieties should be largely sown, for use from November onward.

Quite distinct from these, and no less hardy, coming into use later in the season, is what is known as the DRUMHEAD KALE. This forms a large close head very like a cabbage, the outer leaves finding favour with many, chiefly owing to their availability for use after all green has been removed, as a substitute for Seakale, while perhaps the most delicate flavoured in the whole section is found in the *Asparagus* or *Buda Kale*, known in some districts as *May Greens*, the long shoots of this during April and early May being almost equal to Asparagus.—F. R. C.

BOTANY FOR GARDENERS.

What has botany to do with practical gardening? The beginner soon learns what the cultivation of flowers means practically, but it is not so easy to be a botanist.

Botany includes the *study* of *all* plants and not only those in gardens; and to understand *how* a plant grows one must learn all about its different parts, such as the roots, stems, and branches, leaves, flowers, fruits, and seeds. Not only all their different forms, but the internal structure by means of a microscope. We require to know *how* a plant grows from a seed until it is full grown and can produce seed itself.

Let us then briefly consider the parts of a plant, namely the roots, stems, and branches, leaves, flowers, fruits, and seeds, from a botanical point of view. Then we shall see what botany has to do with gardeners. It is clear that if a gardener has to cultivate plants, he should know what they require in order to grow healthily and bear fine flowers or good fruit. It is the study of botany which teaches us this.

The first group of parts of a plant to be considered are called the *Vegetative* "organs." These are concerned with growth only as a rule, while the flowers and fruits are the *Reproductive* "organs."

Let us begin with the root. Dig up a small herb, and the root will be seen to be continuous with the stem, as of a wallflower, shepherd's purse, or groundsel; but it differs in not being green. Moreover, it branches two or three times into fine rootlets. The tip of each end is a point like that of a pin.

Now this point has to grow and so push the soil aside. Being extremely delicate, its "growing point" must be protected, so a tiny "root-cap" consisting of dead cells is constantly being renewed to protect it. This can only be seen under a microscope, which no botanist can do without.

He will also see the cells on the surface extend as fine hairs or tubes, closed at the end. These are for absorbing water from the soil.

Now the gardener will understand that if we wish to transplant a herb or larger plant, it is most important to preserve the finest root-ends, because if they be broken off, the plant cannot get any food till they are renewed, which takes time.

Such is the first practical lesson the gardener has to learn from botany.

The next thing is to know what substances, *i.e.* minerals, are necessary for a healthy plant. These are absorbed, dissolved in water, by the "root-hairs" mentioned above. But this is a long story and will be learnt elsewhere.

The next question is, after having taken up its mineral food in water, how does the water travel up the plant to get to the leaves, etc.? For no part can live without it; as we can see how lettuce leaves "wilt," as the Americans say, if water is insufficient.

We must use the microscope again, and we discover little tubes called "vessels" running up the stem and branching off into the branches and up the so-called "veins" of the leaves. The latter subdivide again, so that every bit of the leaf can be nourished.

The leaves are the most important "organs," for they not only *digest* the food brought up by the "sap," but get more out of the air.

As the reader may know, we breathe in order to take in the oxygen out of the air; but we do not breathe it out again but expire "carbonic acid" gas. This is not poisonous, but "suffocating," and renders the air very impure if a room be full of people and with insufficient ventilation. Now all green parts of plants, as leaves and branches, take in this gas and use it as food, and in exchange discharge oxygen into the air; so that we have to thank all sorts of vegetation for purifying the air, which the animal kingdom is obliged to make impure.

But how do plants do it? Botanists have investigated the process. The reader will find a full account of it in the article on *PLANT PHYSIOLOGY*. All we can say here is, that light is the means by which the plant "assimilates" or converts carbonic acid gas into starch. And out of this it builds up its various structures.

We may go a step further. Every gardener knows that colourless light can be divided up into red, orange, yellow, green, blue, and violet-coloured rays, as seen in a rainbow. To find out if there was any difference in using coloured glasses, I grew lettuces from the young state, 4 ins. high, till full grown. Under red the stems were about 16 ins. long; they were shorter and shorter, till one came to the blue and violet, under which they were *nearly* as short as in open ground.

This showed that they wanted all the coloured rays, *i.e.* ordinary colourless light.

To ascertain how much solid matter was made, the plants were dried, and the greatest amount was found to be under yellow and blue, and least under green glass.

This botanical experiment revealed the fact that it is unwise to use any *coloured* glass in conservatories. My experiment was independently corroborated at Kew, for the authorities had put green glass in the ferneries, but they found that it proved so injurious, that it had to be replaced by uncoloured glass. Such is another lesson from botany.

Physiological botany—of which the preceding is an example—teaches much. How comes it that the wild carrot, parsnip, and beet are so totally different from the cultivated plants? In the wild state they are weeds with long, slender, but tough roots. By sowing the seed in a rich garden soil, the seedling soon discovers what a bountiful supply of food it has. It grows apace; its leaves grow larger, make more starch or sometimes sugar, than it used to require, so the root begins to enlarge as a storehouse for it. Moreover, it goes on at this work longer than when it grew in a dry, poor soil, and, so to say, forgets to blossom the first year, and consequently it lives through the winter. In the second year the time has come to produce seed, so it uses up all its stores of food, bursts into blossom and makes seed, then it dies. It has thus become a "biennial" from having been an "annual."

And such is the botanical explanation of the origin of our "root-crops." The late Mr James Buckman, when Professor of Botany at the Cirencester Agricultural College, raised from seed from the wild parsnip, in 1847–51, a fine kitchen root. He handed over the seeds to Messrs Sutton & Sons, and after "improving" it, they issued it as the now well-known "Student" parsnip, having been first raised in the botanic gardens of the College.

But leaves do more than "assimilate" carbonic acid gas, they must *breathe* or "respire." This they do at all times, night and day, as it is induced by heat and not by light; but the amount of this bad air or carbonic acid which they "give out" is small compared with the amount of the same gas which they assimilate.

There is yet another "function," as we say: they must "perspire" as we do. This is called in botany *Transpiration*, and my experiments with the lettuces proved that the greatest amount of water given off was under red and violet glasses.

It is not *heat*, therefore, but *light* which is required for this process; though heat will, of course, cause water to "evaporate" from all tissues, dead or alive. But that is a different thing from transpiration, as lettuces will "wilt" on a hot bright day, but not on a similarly bright day which is not so hot.

Now let us come to the flowers. We all know that these precede the making of seed. The first thing a gardener should know is the structures of as many flowers as he can get. He must have some little elementary book on Botany to teach him.[1] It is important to understand how a flower can produce seed. To do this he must be familiar with the *stamens* and *pistil*, the innermost parts of the flower, for "crossing" and "hybridising," as these processes form an essential part of the gardener's profession.

At the same time the gardener should learn how plants are *classified* by the structure of their flowers and fruits.

If, for example, he had learned how to fertilise one sweet pea by another of a different colour, he might think he could get a "cross" between a large-flowered *Ranunculus* with a *Potentilla* or *Geum*, as they look very much alike. But if he has learnt a little "Systematic Botany," *i.e.* Classification, he would know that the first was not in the same "family" as the two latter, and that no members of distinct families can be "crossed."

The above are the most obvious facts which a gardener learns from botany. While "Systematic" Botany teaches him "Classification," "Physiological" Botany explains *how* a plant grows, and what are its requirements to enable it to live a healthy life and leave an abundant offspring.

Lastly, what has been said above about root-crops will show how plants can *change* in form, size, etc., and so render to us far more useful results either for food or ornament. This is called "Evolution."

As we can "evolve" new forms in the garden, so if the student extended his studies outside the garden, and observed wild plants growing under various conditions — as in very dry situations, say, on heaths, or hot deserts; or again on mountains and in cold arctic regions—he could not fail to see how certain plants closely resemble others which may not even belong to the same family. Similarly plants growing in water assume the same characters, though of different families altogether; so that without the flowers, which are not affected by the change, they could be scarcely recognised.

What is the inference? It has been proved by observers in all parts of the world that plants change their forms in "adaptation" to their changed surroundings — such as drought, great heat, bog-land, water, high mountains, and the arctic regions, etc.

Hence when a gardener makes a rockery he looks to the Alps for examples of *dwarf* plants of many different kinds; for this is one of the features all high Alpine and Arctic plants have acquired.

In former days botanists did little more than collect plants and name them. *Now* we study the conditions in which they live. This is called *Ecology*. As *Economy* means the right *ordering* of a home, so the former is the *study* of the *home* of the plant.

Such is the study of botany, and the gardener will see that much he has to do with is what was learnt from the botanist and *not* from the cultivator.—G. H.

See also *EDUCATION AND GARDENING*.

BOTRYANTHUS.—Now included in the genus MUSCARI.

BOTRYTIS CINEREA. — See *DISEASES OF PLANTS*.

BOTTLE BRUSH (*Metrosideros floribunda*).—See *METROSIDEROS*.

BOTTLE GOURD.—See *ORNAMENTAL GOURDS*.

BOTTLE GRASS (*Setaria viridis*).—See *SETARIA*.

BOTTLING FRUIT. — See *FRUIT BOTTLING AND PRESERVING*.

BOTTLING PEAS AND BEANS.—See *VEGETABLE BOTTLING*.

BOTTLING VEGETABLES. — See *VEGETABLE BOTTLING*.

BOUR TREE (*Sambucus nigra*).—See *TREES*.

BOURBON LILY.—See footnote to *Lilium candidum* in *LILIES*.

BOURBON ROSE (*Rosa bourbonia*).—See *ROSE SPECIES*. For the best varieties see *ROSE CLASSES*.

BOURSAULT ROSE. — See under *Rosa alpina* in *ROSE SPECIES*. For the best varieties see *ROSE CLASSES*.

BOUTELOUA (GRAMA GRASS. Nat. Ord. Gramineæ). — A genus of hardy perennial grasses grown very easily in ordinary soil but of little garden value. The best known species are *B. racemosa* and *B. Rothrockii*. Both flower from July to August, and average 9–12 ins. high.

---

[1] E.g. *Botany for Beginners* (Stanford), or *Oliver's Lessons in Elementary Botany* (Macmillan).

BOUVARDIA (JASMINE PLANT. Nat. Ord. Rubiaceæ).—This is a beautiful evergreen flowering shrub and is most useful for furnishing a supply of flowers from September to January. It is propagated by cuttings of young shoots in heat, in March and April, inserted in a light fibry loam, leaf-mould and sand. Temperature needed 45–55° F.

Greenhouse Species and Varieties.—*Bouvardia Alfred Neuner.*—Double white. Flowers from September to January. Height, 1–1½ ft.

B. Bridal Wreath.—White. Flowers from September to January. Height, 1–1½ ft.

B. Humboldtii corymbiflora.—White. Flowers from September to January. Height, 1–1½ ft.

B. King of Scarlets.—Scarlet. Flowers from September to January. Height, 1–1½ ft.

B. President Cleveland.—Vivid scarlet. Flowers from September to January. Height, 1–1½ ft.

B. Priory Beauty.—Delicate rose. Flowers from September to January. Height, 1–1½ ft.

B. Vreelandii.—Pure white. Flowers from September to January. Height, 1–1½ ft.

BOX.—The genus BUXUS. See *SHRUBS.*

BOX ELDER (*Acer Negundo*).—See *TREES.*

BOX THORN (*Lycium chinense*).—See *CLIMBING AND TRAILING PLANTS.*

BOXES, CAPACITY OF.—See CAPACITY OF TANKS OR BOXES under VOLUMES in *ARITHMETIC AND GARDENING.*

BOYKINIA ACONITIFOLIA.—A name given to *Saxifraga aconitifolia*, which see in *SAXIFRAGA.*

BRACHYPODIUM (FALSE BROME-GRASS. Nat Ord. Gramineæ).—This is a genus of weeds the value of which for garden decoration is *nil.*

BRAMBLE.—See the genus RUBUS in *SHRUBS.*

BRAMBLES AND BERRIES.

Since the introduction of airtight preserving bottles these have come to the front, and are most useful in winter.

The WILD BRITISH BLACKBERRY repays for liberal treatment, but the most productive is the PARSLEY-LEAVED BLACKBERRY with big fruits. The LOGANBERRY also is splendid for jam or bottling and grows with great luxuriance. It resembles a giant raspberry but comes off with a core like a blackberry. We do not find the variety *Phenomenal* any improvement, and of several novelties we cannot at present give an opinion.

Culture is simple. After fruiting, merely cut away the old fruiting rods and train the new growths 2 ft. apart right and left on stakes to ripen the wood. This ensures a good crop the following season.

G. B.

[Other berries of easy culture are the HAILSHAMBERRY, the KINGSACREBERRY, the LAXTONBERRY, the LOWBERRY, and the WINEBERRY.—EDITOR.]

BRANDY BOTTLE (*Nuphar luteum*).—See *YELLOW WATER LILY.*

BRASILLETO.—A name applied to the genus CAESALPINIA. See *SHRUBS.*

BRASSAVOLA.—See *ORCHIDS.*

BRASSIA.—See *ORCHIDS.*

BRASSICA (Nat. Ord. Cruciferæ).

This is a large genus of hardy and half-hardy annuals and hardy or half-hardy biennials, including cabbages and greens in all their classes. It would be useless to give a list here of the various vegetables under their Latin names, as an article on each vegetable headed with its well-known English name, followed by the botanical one, appears in its proper place. Nor shall we enlarge here on the general culture of the genus, for that too would be wasted space, since full details of the culture of each of these vegetables is given in each separate article.

See also under MUSTARD in *MEDICINAL HERBS*, and paragraph on MUSTARD AND CRESS in *SALAD PLANTS.*

BRASSICA FAMILY. — See *KINDS OF CROPS.*

BRASSOCATTLEYA.—See *ORCHIDS.*

BRASSOLÆLIA.—See *ORCHIDS.*

BRASSOLÆLIOCATTLEYA. — See *ORCHIDS.*

BRAVOA (Nat. Ord. Amaryllidaceæ).—This is a genus of half-hardy bulbs, the outdoor culture of which is only possible in the warmest of districts, greenhouse treatment giving the best results elsewhere. Light rich soil with plenty of rotted leaf-mould suits them admirably. *B. geminiflora* is the best known species, and bears red flowers in July and August on plants about 12 ins. high.—E.

BRAZIL NUT.—See *NUT CULTURE.*

BREVOORTIA (Nat. Ord. Liliaceæ). Only one species of this hardy bulbous plant is at all generally grown. This, *B. Ida-Maia* (Syn. *B. coccinea,* and *Brodiaea coccinea*), is popularly known as the CRIMSON SATIN FLOWER. It may be had in yellow, red, and dark crimson forms, and blooms from June onwards, growing 1–1½ ft. in height. Its general cultured requirements are the same as those of *BRODIAEA,* which see.—J. J. & E.

BRIANÇON APRICOT (*Prunus brigantiaca*).—See *TREES.*

BRIDAL WREATH.—See *FRANCOA.*

BRIGHT YELLOW CLEMATIS (*Clematis tangutica,* or *C. orientalis tangutica*).—See *CLIMBING AND TRAILING PLANTS.*

BRISTLY FOXTAIL GRASS. — See *SETARIA.*

BRITISH MYRRH PLANT. — See *SWEET CICELY.*

BRITISH WILD LILY OF THE VALLEY (*Convallaria majalis*).—See *LILY OF THE VALLEY.*

BRITTLE BLADDER FERN.—(*Cystopteris fragilis*).—See *FERNS AND FERN GARDENING.*

BRIZA (QUAKING GRASS. Nat. Ord. Gramineæ).—This is a genus of hardy ornamental grasses useful for garden decoration and of very easy culture. The two best species are described in our article on *ORNAMENTAL GRASSES.*

BROAD BEANS. — See *BEANS* and *VICIA.*

BROAD BUCKLER FERN (*Nephrodium spinulosum dilatatum*).—See *FERNS AND FERN GARDENING.*

BROAD-LEAVED EVERLASTING PEA (*Lathyrus latifolius*). — See *CLIMBING AND TRAILING PLANTS.*

BROAD-LEAVED PARADISE STOCK. See under STOCKS USED in *FRUIT CULTURE : HARDY.*

BROCCOLI (*Brassica oleracea botrytis asparagoides.* Nat. Ord. Cruciferæ). —Few vegetables are more widely appreciated than this, and so it is important to maintain a succession as long as possible. Great attention should be paid to the selection of varieties, also the date of sowing, since it is only by this means that good heads can be cut from October until June.

Culture. — In common with all other plants of this tribe, good results need only be expected on ground which has been liberally treated with rich manure. Whenever possible, prepare the site as early in spring as circumstances allow; or where the local conditions are such as compel this crop to follow one of another kind the same season, endeavour to make the ground so firm either by rolling or trampling it, that planting is only possible with considerable difficulty.

Unless the site is made solid, the

strong sturdy growth so essential to plants which are to pass through an ordinary winter unharmed will not be forthcoming. A good firm root-run induces a slow but very hard growth, and plants grown under these conditions are much less susceptible to damage from severe frost, than others which during a warm autumn make tremendously large leaves and stems, but fail to give the heart the necessary protection even against the earliest winter frost. In addition to a firm soil, plenty of room between the plants is of utmost importance, this being equally as essential while they are still in the seed-bed, as when they are put out into their permanent quarters. A few weeks in an overcrowded condition during the first stages of growth may so ruin the constitution of the plants as to handicap them severely the whole season.

The seed-bed should always be made in good open quarters away from the shade of trees or buildings. When preparing it use air-slaked lime or soot freely to deter the attacks of many insect pests. Where an extra long succession of good heads is needed, make a start early in March. To follow these sow again in April. The main sowing of late varieties may be deferred until the first week in May. This last section boasts of a large number of good sorts, and is of such great importance that where only a few score or so are required, selection from this is most advisable, for if sown thinly at the period mentioned and good cultivation observed, the heads will be ready for use just when other fresh vegetables are most scarce.

Before the plants get crowded in the seed-bed, or as soon as the second pair of leaves are formed, carefully lift a good number of the most promising, with a small fork and replant in rows about 6–8 ins. apart, allowing the same distance between the plants. If this is done at the stage mentioned, every plant will make new roots at once, and later on may be lifted with a good ball of earth full of fibres, which enable it to be transplanted without a check. Those put out direct from overcrowded beds, which plants have very little root, will be very different. These in an unfavourable summer fail to make good growth for many weeks. Where the garden is an exposed one, or the soil very light, instead of following the usual plan by planting in the flat ground, it will be an advantage to plant in deep drills drawn out with the hoe; this will allow water being given to the plants without any waste, and also enable the grower, where the garden is exposed to strong easterly gales, to draw additional soil to the stems of the plants early in the autumn, thus securing them against damage from wind, and later from frost. This precaution has saved many plants when others growing in the same district have been ruined. When planting allow about 2–3 ft. between the rows, and not less than 2 ft. between the plants which are to stand the winter, the early sorts needing a trifle less.

Good Varieties.—*For Early Use.*—Grange's White Cape, Michaelmas White, Self-Protecting.

To Succeed These.—Backhouse's Winter White, Favourite, Osborne's Winter White, Snow's Winter, Vanguard.

For Spring and Summer.—Eastertide, Late Queen, Methuen's June Model, Reading Giant, Wilcove's Superb White.—F. R. C.

NEW VARIETY.

Whitsuntide.—This has very large, firm white heads. It is very hardy, and comes into use in June.

BRODIAEA (MISSOURI HYACINTH. Nat. Ord. Liliaceæ).—A race of pretty bulbous plants native to the Argentine, Brazil, and California, flowering as a rule in June and July. They are very varied in their habit, now that *Milla, Triteleia,* and other genera are included in the genus *Brodiaea.*

Culture.—This is easy, if a rich light well-drained soil and a sunny position are available. The bulbs should be planted either in September or October, and once well established they may be left undisturbed for several years, when they will quickly increase. Annual lifting is quite unnecessary. Nothing is gained by it unless an increase of any special varieties is wanted.

Brodiaeas may be successfully grown in 5-inch pots in light loam mixed with leaf-mould and sand. Plant the bulbs an inch apart each way, finishing potting by the end of October. Plenty of water is necessary while they are in active growth. The smaller species or varieties may be planted on rockwork and carpeted with some low growing plant.

What to Grow.—*Brodiaea californica* has umbels of deep purple flowers, and blooms in June. Its height is 1½ ft.

B. coccinea (Syn. *Brevoortia Ida-Maia*). See article on *BREVOORTIA.*

B. grandiflora is a blue-purple. It flowers in June. Height, 1½ ft.

B. Howelli lilacina produces pale blue or lilac flowers in July. Height, 1½–2 ft.

B. ixioides splendens (Syns. *Milla ixioides* and *Calliprora lutea*).—This variety has soft yellow flowers borne in umbels in early June, on plants 9 ins. high.

B. laxa (Syn. *Milla laxa*).—This bears numerous rich purple flowers in large umbels in June, and is 1–2 ft. high.

B. peduncularis (Syn. *Triteleia peduncularis*).—This is similar to *B. laxa* in growth, and bears porcelain coloured flowers in June, on plants 12 ins. high.

B. uniflora (Syn. *Milla uniflora*).—This is a charming rock plant. It produces a wealth of pale lilac-blue flowers in April and May. Its height ranges from 6–9 ins.—J. J. & E.

BROMPTON STOCKS.—See *STOCKS.*

BROMUS BRIZAEFORMIS (Nat. Ord. Gramineæ).—The genus Bromus includes about forty annual, biennial, and perennial species of grasses, of which this is one of the most ornamental. Seeds should be sown in clumps or lines where the plants are to grow, in April or May (the resulting plants being thinned out to 6 ins. apart). Any good well-drained garden soil, in a sunny or open position, will be suitable. The stems may be cut, when in bloom, for mixing with cut flowers or to dry for home decoration in winter. The average height is 18 ins.—J. F.

See also *ORNAMENTAL GRASSES.*

BROOM.—A name applied to the genus CYSTISUS, which see in *SHRUBS.*

BROOMS.—See *GARDEN TOOLS.*

BROUGHTONIA.—See *ORCHIDS.*

BROUSSONETIA.—For the best species see *TREES.*

BROWALLIA (Nat. Ord. Solanaceæ).—The perennial shrubby species of this genus are only used to a very limited extent out of doors and in the greenhouse, so we need not describe them here. Two annual species, however, are worthy of note.

Browallia demissa (Syns. *B. elata, B. lactea, B. linnaeana,* and *B. nervosa*) is a bushy sort bearing clusters of violet-blue flowers in August and September, and 9–15 ins. high.

B. grandiflora bears light yellow flowers from June onwards, and grows 2 ft. high.

Both sorts are best treated as half-hardy annuals, raising seedlings in gentle heat, potting them singly, in light soil, and growing them in the greenhouse or frame till planting out time in June. *B. demissa* is a capital pot plant for conservatory decoration or for grouping.

C. H. C.

BROWN KNAPWEED (*Centaurea Jacea*).—See *CENTAUREA.*

BROWN ROT.—See *APPLE DISEASES.*

BROWN SCAB.—See COMMON SCAB in *POTATO DISEASES.*

BROWN SCALES.—See *INSECT PESTS.*

BROWN TAIL MOTH.—See *INSECT PESTS.*

BRUCHIDÆ.—See PEA AND BEAN SEED WEEVILS in *INSECT PESTS.*

BRUGMANSIA. — A synonym for *DATURA,* which see.

BRUSSELS SPROUTS (*Brassica oleracea bullata gemmifera.* Nat. Ord. Cruciferæ). — Among winter vegetables none enjoy greater popularity than these, and although to the ordinary man who purchases his supplies from the greengrocer there may appear to be little or no difference between varieties, experienced growers know full well the suitability or otherwise of particular sorts for their own soils. Some of the more recent additions to these show a great improvement over earlier introductions, many of these combining superior table quality with increased productive powers, the aim of present-day raisers being to secure plump solid sprouts together with increased hardiness, rather than large size, which at many tables is not a recommendation.

Culture.—These may be termed the gluttons of the vegetable garden, it being impossible to produce plants any way approaching in size or appearance those usually found in tradesmen's seed lists without adding plenty of rich humic stable or cow-manure to the soil. Artificial fertilisers are not efficient substitutes.

Next to the manure, failure to provide adequate space between the plants for the development of the huge heads has an important bearing on the crop, and other conditions being right, is directly to blame for small crops of poor quality. Even where space is very limited, the idea of attempting to grow two plants where there is only sufficient room for the proper development of one, should not be encouraged, for, generally speaking, the result of this short-sighted policy is a lighter crop and sprouts of inferior quality than would have followed the planting of half the number.

For very early gathering it is usual to sow a little seed under glass early in February, and by successive prickings out, or potting on, we obtain strong plants about 9–12 ins. high, ready for planting out by 30th April. Such plants, if very liberally treated when in their summer quarters, usually give good firm sprouts during August ; but a sowing made on a well-prepared bed in the open border any time after the 1st of April may be depended upon to give an abundant crop of sprouts from October to January. A later sowing made between 1st and 21st May, if carefully treated as regards watering during early growth, will carry on the supply until the end of March. Sow the seed very sparingly in every case, and far better than the popular plan of sowing in narrow drills, let them be about 3 ins. wide, and not less than 9 ins. apart, covering the seed with about an inch of fine soil.

If no preliminary transplanting to temporary beds can be undertaken, as soon as the seedlings are a few inches above the ground, reduce the number to allow each to stand at least 2 ins. from its neighbour, but whenever possible temporary transplanting to 9 ins. apart each way is advisable, for if the bed these are to occupy for a few weeks is enriched with a little old hotbed manure, or well-decayed leaf-soil, and a minimum of 9 ins. each way allowed between the plants, they will take no harm even though left until the end of July. The large number of fibrous roots each plant will then carry will enable it to pass through that usually very trying period without injury. Use a garden trowel when planting out, and follow immediately by a thorough watering. The distance between the rows should never be less than 2½ ft.; 6 ins. more where the ground is exceptionally well manured. Two feet between the plants will be ample for most varieties mentioned below, the last three giving good sprouts at 18 ins.

Although well able to withstand an ordinary English winter, when frost is particularly severe or prolonged, these, in common with most other hardy greens, fail to pass unscathed. For this reason, should indications be apparent that the thermometer is going to fall unduly low, the lifting and safe housing of a dozen or so of the best plants is advisable.

The heads of the plants together with the large leaves should be permitted to remain on the plants until the last of the sprouts are gathered, when they may be cut off and used as a cabbage.

Varieties. — Among the many sterling varieties now offered by leading firms, the following are recommended:—Sutton's Exhibition, Matchless, Solidity, The Wroxton, Cambridgeshire Champion, President Carnot, Sutton's Dwarf Gem, Scrymger's Giant, The Bullet, Veitch's Paragon.—F. R. C.

BRYANTHUS.—For the best species see *SHRUBS.*

BRYOBIA.—See RED SPIDERS in *INSECT PESTS.*

BRYONIA (BRYONY. Nat. Ord. Cucurbitaceæ).—This is a genus of weedy plants of no garden value whatever, though in the old days some species were esteemed on account of medicinal virtues. The best known sort is *B. dioica* popularly called DEVIL'S TURNIP on account, no doubt, of its violent purgative properties. It is an ornamental climber for rough places.

BRYONY.—See *BRYONIA.*

BUBON.— Now included in the genus *SESELI.*

BUCK BEAN. — See *MEDICINAL HERBS* and *MENYANTHES.*

BUCK-WHEAT (*Fagopyrum esculentum*).—See *FAGOPYRUM.*

BUCKLER FERN. — The various forms of this are referred to under NEPHRODIUM in *FERNS AND FERN GARDENING.*

BUDA KALE. — See *BORECOLE, or KALE.*

BUDDING.— See *PROPAGATION OF PLANTS.*

BUDDLEIA.— For the best species see *CLIMBING AND TRAILING PLANTS* and *SHRUBS.*

BUFFALO BERRY. — The genus SHEPHERDIA. See *SHRUBS.*

BUFFALO CURRANT (*Ribes aureum*). See *SHRUBS.*

BUFFALO GRASS (*Tripsacum dactyloides*. Nat. Ord. Gramineæ).—This is a hardy grass of small value to gardeners, though sometimes grown in the wild garden, where it will thrive in any soil.

BUGLOSS (*Lycopsis arvensis*). — See *LYCOPSIS.*

BUGS.— See SOWBUGS under WOODLICE in *INSECT PESTS.*

BUILDERS' YELLOW SAND.— See *SAND.*

BUILDING A ROCK GARDEN.—See *ROCK GARDEN: MAKING A.*

BUILDING A WATER GARDEN.—See *WATER GARDEN, THE.*

BUILDING GREENHOUSES.—See *GREENHOUSE: BUILDING AND HEATING.*

BUILDING WALLS. — See note at end of *GARDEN WALLS.*

BULB MITE.—See *INSECT PESTS.*

BULB PLANTING.

A few hints on this all-important subject are given below.

Where there are to be Wallflowers with Double Arabis as an edging, Daffodils may be planted between the lines of Wallflowers, and the effect will be very fine indeed, especially if the Wallflower be blood-red. May-flowering Tulips should on no account be planted in amongst Wallflowers, but in a bed to themselves, or in a bed on which Forget-me-nots are planted. Aconites, Crocuses, Grape Hyacinths, Snowdrops, and others may be used for edging instead of Double Arabis, but they are soon over.

Hyacinths should not be wasted among Wallflowers. If a rather long bed is to be filled, have a double row of tall Daffodils at the back, then a row of May-flowering Tulips, in front of this a row, or, better still, a double row of bedding Hyacinths, and lastly in front of this an edging of Crocuses and Snowdrops. This bed will be a lasting joy.

You should certainly have at least one small bed filled with Hyacinths only, just edged with Crocuses; but with regard to the Tulips, a better effect is produced to my mind if the colours are kept separate. (Hyacinths are seldom abundant enough to allow this.) Have a bed of dark red Tulips, then two of white and one of yellow if the beds are in a line. Single Arabis may be used for covering the soil of the bed.

If you have separate beds to devote to Daffodils do not fill these with bulbs the names of which you are not sure of. Get named varieties for these beds, such as Emperor, Mme. de Graaff, Empress, and Horsfieldi. Daffodils may well be planted in beds alone, but excellent effects are produced if they are planted in circles, and surrounded by a circle of early Tulips such as Duc van Thol or Pottebakker.

So much for suggestions as to how to get pleasing effects. Now let me give a few cultural details, for it is those that will be very useful.

The Planting of Bulbs.—Outdoor bulbs should be planted preferably in good time in October, but at any rate got in by All Saints' Day. The soil if heavy should be lightened by digging in some sand, and should be enriched if poor by adding some old hotbed manure. This, however, must be buried *deeply*.

The bulbs need not be planted with a trowel (except in the case of Hyacinths), but with a large unpointed dibber. The haft of an old spade is excellent for this purpose. A piece of wood should be tacked on to the dibber transversely, so that the dibber may be put in a uniform depth. The soil must be broken up and made friable so that this can be done easily.

About the Depth to Plant.—The following have been well tried and are considered the best:—Crocuses 3 ins., Daffodils 4 ins., Hyacinths 4 ins., Tulips 5 ins., Winter Aconites 3 ins., Snowdrops 3 ins., Scillas 4 ins. Any other bulbs may be safely planted three times their own depth in soil.

As regards the distance apart to plant, this should average 6–9 ins. with the bigger bulbs. Clumps of Crocuses and Snowdrops may also be 6 ins. apart.

Final Remarks.—It may be well before concluding to give one or two final remarks and then sum up

The biggest point which makes for success is to get good bulbs. *Never* buy cheap collections of bulbs, but go to a good bulb man, and pay a fair price.

See the bulbs before you buy them, and buy as soon as possible after August. Good bulbs have a firm feeling about them.

Don't buy bulbs at auction sales or from firms who advertise flagrantly.

Don't try to plant various sorts of bulbs in geometrical figures unless you have a good knowledge of Geometry. A figure that has "not quite come off" is a hideous eyesore. Keep to squares and easy curves in this form of planting. These are not hard to get fairly accurate.

To sum up the main cultural points, I may say: Give a good well-worked soil with sand in it: Plant as early as conveniently possible: Plant with a large unpointed dibber, not too deeply, and plant bulbs of each genus uniform depths: Make moderately firm after filling in the holes; and give each bulb room enough in the bed for it to develop.—E.

BULBOCASTANUM.—Now included in the genus *CARUM.*

BULBOCODIUM (Nat. Ord. Liliaceæ).—Only one species of this hardy Crocus-like bulb is at all generally grown. This, *Bulbocodium vernum* (Syn. *B. ruthenicum*), popularly known as the SPRING MEADOW SAFFRON, and its variety *versicolor,* bear purple flowers in February and March, on plants 3-6 ins. high. Only the simplest culture is required, the bulbs being planted in the autumn in the usual way.

BULBOPHYLLUM.—See *ORCHIDS.*

BULBOUS BEE PLANTS.—See *BEE PLANTS: LISTS OF.*

BULBOUS CROPS.—See *KINDS OF CROPS.*

BULBOUS IRISES.—See *IRISES.*

BULBOUS PLANTS FOR CITY GARDENS.—See *TOWN AND CITY GARDENING.*

BULBOUS PLANTS FOR CONSERVATORIES.—See *CONSERVATORY.*

BULBS AND BULBOUS PLANTS.—Notes on these appear mostly under their English names throughout the work.

BULBS: CLEANING AND STORING.

Amateurs often regard bulbs which have been grown in the borders for a season or two as useless for further planting, and consequently throw them away. This is very wasteful, and, indeed, it is running some risk even to leave bulbs in borders for two seasons if such borders are to be "bedded out." In both cases it would be better to lift, clean, and store as soon as the bulbs have finished flowering.

Drying-off Bulbs.—There are various ways of doing this. Some gardeners lift the bulbs and lay them in for a time in a north border for the growth to wither away; then they lift them again and dry prior to storing. As a matter of fact it appears to be rather a waste of time to lift, replant, and then lift again. The better plan is to lift the bulbs and merely to shake the soil from their roots, cutting no leaves or roots off, and then to lay them out in a single layer on a sunny path or sloping bank to dry, turning them over from time to time to ensure every part reaching the sunlight. It is better not to put them into boxes and to stand the boxes outside, since during wet weather it may happen that the wood of such boxes swells, and then the boxes will hold water, causing the bulbs to rot off instead of to dry. When thoroughly dry the leaves will have withered away and become brittle and brown, the bulbs themselves will be hard, but the outer skins will be soft and papery. The roots will mostly be like thin greyish bits of string; they will be shrivelled up and lifeless.

Cleaning.—This is an important matter. First of all the withered tops should be pulled away from the top of the bulb, and the withered roots clipped off with secateurs or shears. Each bulb should then be worked between the hands to remove soil and loose outer skin, and any broken pieces still adhering may be gently pulled off. Great care must be taken not to *peel* the bulbs, as otherwise they will not keep long; only the skin which is loose and has been in direct contact with the soil should come off. Usually below this outer skin little bulbils will be found clustering round the parent. The largest of these may be saved and replanted in nursery beds, the rest being destroyed.

Storing.—Bulbs are not difficult to store, since they only have to be out of the soil during the drier part of the year, namely, in the summer. So long as a cool dry place is available they should store perfectly after being well dried. Barrels can be used for the larger bulbs, such as daffodils and hyacinths, while brown sugar bags will serve the purpose admirably for the smaller bulbs. Darkness is not, of course, absolutely essential for the successful storing of bulbs, but, generally speaking, it is usually considered best to keep the light from them in the summer months.—E.

BULBS FOR THE ROCK GARDEN. See *ROCK GARDEN BULBS.*

BULBS: NATURALISING.—See *NATURALISING BULBS.*

BULBS: STORING.—See *BULBS: CLEANING AND STORING.*

BULL BAY (*Magnolia grandiflora*).—See *CLIMBING AND TRAILING PLANTS.*

BULLACE, or BULLACE PLUM. (*Prunus insititia*).—See *TREES.*

BULLACES.—See *DAMSONS AND BULLACES*, where a selection of varieties of these is given.

BULLEY'S PRIMROSE (*Primula bulleyana*).—See *PRIMULA.*

BULRUSH (*Scirpus lacustris*).—See *SCIRPUS.*

BUNCH GREENS.—A popular name for *COLEWORT*, which see.

BUNIUM.—Now included in the genus *CARUM.*

BUPHTHALMUM (Nat. Ord. Compositæ).—This genus is little known but might well be grown more often than it is. Readers will remember the INULA. This plant is not unlike it.

Culture.—This is easy. Any good garden soil seems to suit the hardy perennial species; and they will succeed in a border fully exposed to the sun. With the half-hardy sorts we need not trouble the reader. Propagation is not difficult; it may be effected by splitting up the old roots in the autumn or spring, or by sowing seeds in the usual way. The planting may be done in November, February, or March.

What to Grow.—The following may be included if space permits:—

Buphthalmum cordifolium.—A synonym of *B. speciosum*, which see.

B. grandiflorum.—A synonym of *B. salicifolium grandiflorum*, which see.

B. salicifolium grandiflorum (Syn. *B. grandiflorum*).—A useful large yellow-flowered species blooming from June to September and averaging half a yard in height.

B. speciosissimum.—A yellow-flowering sort blooming in June and July, but a little taller than the last named.

B. speciosum (Syn. *B. cordifolium*).—A tall yellow mid-summer blooming sort attaining a height of nearly 2 yds.—E.

BUPLEURUM.—For the best species see *SHRUBS.*

BUR CHERVIL (*Anthriscus vulgaris*). See *ANTHRISCUS.*

BURDOCK. — See *ARCTIUM* and *MEDICINAL HERBS.*

BURGUNDY MIXTURE.—See *SPRAYING MIXTURES AND FUNGICIDES.*

BURNET.—See *POTERIUM.*

BURNET ROSE (*Rosa spinosissima*).—See *ROSE SPECIES.*

BURNING BUSH (*Dictamnus albus purpureus*).—See *FRAXINELLA.*

BURNING BUSH (*Euonymus atropurpureus*). — See *CLIMBING AND TRAILING PLANTS* and *SHRUBS.*

BURNING GARDEN RUBBISH.

In the article on *VEGETABLE MATTER* we praise the plan of allowing green garden refuse of a soft and clean nature to decompose into manure. We mention, however, that certain kinds of rubbish are undesirable for the purpose of making into manure, and we advise that they should be burnt in the way described in the present article.

Before describing the various ways of burning garden rubbish, it may be useful to give a list of the more common forms of rubbish which should be burnt, since it is easy for gardeners who have not had many years of experience to mistake as good material for making into manure, rubbish which is not only valueless but may prove very, dangerous indeed if put to this purpose. Gardeners might do well to commit the list to memory, and then they will recall it when working out of doors.

First of all we must place on the list any and every form of wood. There are wood chippings which are often abundant when new fencing is being put up, or old repaired; there are twigs which are so abundant when there has been a stormy week; and there are woody trimmings from climbers, fruit trees, hedges, roses, and shrubs. All these are not the least use for making into vegetable manure.

Next come certain kinds of leaves. As a general rule most kinds of shrub leaves are undesirable for rotting down into humus. Of tree leaves, ash, elm, holly, horse-chestnut, ivy, plane, poplar, privet, sycamore, and indeed other sorts as well are little use for vegetable humus, so should be burnt. With them must go the droppings or needles from pines and other coniferous trees. These last are extremely detrimental if dug into the soil, and even to use them as a mulch, which one sees recommended so often, is undesirable in our opinion, since the resinous and oily matter they contain is abhorred by nearly every variety of plant.

After these we come to weeds. Now the "pen gardener"—a gentleman for whom we have considerable contempt—says to us in his books and articles: "Burn up every weed which grows in the garden and spread the ashes on the soil."

But as we see in another article if this doctrine is acted upon we often waste much which might be turned to good account in the way of humus. So for burning we should avoid the softer rottable kinds of weeds with very few exceptions. All deep rooting weeds (if we cannot sell them to herbalists) should go to our garden fire, also all creeping weeds. One gentleman was preaching [1] the stacking of twitch and other equally dangerous weeds such as coltsfoot, dandelions, and docks, in large heaps for a year, after which "they can be spread on the land and make most valuable manure." This gentleman, who was by many considered to be an authority, ought to know better than to give such very bad advice. Twitch will not all be dead even after stacking for thirty months, and to spread it on the land after a single year is to undo all the good you have done the previous year. The only safe place for twitch and other violent weeds is in the garden fire.

---

[1] At a lecture attended by the writer in South Yorkshire.

There are some weeds which may look innocent enough but are really great dangers. These include chickweed and other similar plants. Thus discrimination is necessary and the gardener should put these sorts also on the fire.

All weeds in seed should also be put on the fire. The idea that the small heat produced by rotting will kill the seeds is entirely erroneous; very often it proves an apt method of forcing them into brisker germination.

After weeds, we come to vegetable garden refuse. Now the material which should be burnt here includes a very wide selection. We suppose that potato tops with their fibrous roots should be put first in the list, for they should never be allowed to rot into manure. A good second place is taken by stumps of cabbages, cauliflowers, Brussels sprouts, and the like, which will, it is true, make fairly good vegetable manure if allowed to rot for a period of something like two and a half years. As these emit an impossibly offensive odour, and breed billions of flies during the process, it is better to get them burnt up. We must also mention asparagus foliage obtained often in cartloads when the beds are cleaned in the autumn. No good purpose can be served by allowing this to decompose into vegetable humus.

Of miscellaneous refuse from the egetable garden which ought most certainly to be burnt we may mention any foliage or roots of plants which are in any way diseased, however slightly. Potato-tops have been mentioned; burning of these is in any case desirable, as we have said, but it is essential if they are diseased. But burning is, in the case of turnip-tops, beet-tops, parsnip-tops, carrot-tops, pea and bean haulm, cabbage leaves, onion and leek foliage, and so on, only desirable when such matter is infested with pests, or infected with diseases. Otherwise it should be allowed to decay, as described in another article.

Of miscellaneous refuse from the flower garden which should be burnt we may mention first any foliage of plants which is distinctly hard or woody in character, as, for instance, the thick stems of full-grown hollyhocks and sunflowers, or the thin wiry stalks of chrysanthemums or Michaelmas daisies. Other plant remains (provided, of course, that they are not carrying diseases or pests) should certainly be allowed to rot. It may be said here, however, that any seed heads on these plant remains should go into the fire, for the seeds will germinate and little plants come up all over the borders from the manure unless burning is done.

Methods of Burning.—The first and most obvious method of burning garden rubbish is to do the work in an open fire. The fire is started with a little wood and paper and then the driest rubbish put on first. Dense clouds of brown or often orange-coloured smoke intermixed with flames are emitted, and the whole heap is reduced to about a twentieth of its original bulk if not less. This is a wasteful way of destroying refuse and one which should not be allowed.

A better method is to start with a very small fire, and see that it never becomes a mass of dancing tongues of flame even for a moment. This is done by piling damp rubbish on to the fire at an early stage and reducing the burning to a smoulder. Rubbish burnt this way is on the fire longer, but the ash produced is much more bulky as well as far more rich in plant-food than is that produced on a roaring fire. Besides this, the burning on what is called a "smother" fire is much less unpleasant. Instead of the dense clouds and thick volumes of smoke produced by the "quick fire" method, there is only a small curling column of smoke which annoys no one.

If the rubbish has for some reason or other had to be neglected and has got into a soaking wet state it will not burn at all easily. An acquaintance who is on the Board of Agriculture tells us that he uses a bucket with a number of holes all round it for burning wet rubbish, and starts a small coal fire in it, putting on the rubbish in small forkfuls first of all, and then in larger quantities when a good mass of red-hot ash has been produced below. He says he never finds this fail as a means of disposing of wet refuse.

Another authority speaks well of a brick kiln made by building a circular cupola with bricks after breaking off their corners. We have tried this method and find it works well so long as plenty of air-holes are left all round. A small fire is started in the bottom, and the rubbish fed in, a small quantity at a time, from the top. It needs pushing down from time to time unless the opening at the top is very large to admit of natural sinking. The ashes are, of course, raked out from one of the holes at the base.

Store the ashes produced by burning garden rubbish in a dry place, for they are quickly ruined by rain. Do not leave them in the destructor, for moisture will soak up from the ground below.—E.

See also *ASHES: THEIR VALUE IN THE GARDEN.*

BURNING SEAWEED. — See *SEAWEED AS MANURE.*

BURNING SOIL.—See *SOIL STERILISATION.*

BURNT CANDYTUFT.— See *ÆTHIONEMA.*

BURR GRASS.—See *CENCHRUS.*

BURR OAK (*Quercus macrocarpa*).—See *TREES.*

BURR THISTLE (*Cnicus lanceolatus*). See *CNICUS.*

BUSH CLOVER (*Lespedeza violacea*).—See *SHRUBS.*

BUSH FRUITS.

Bush fruits, as is generally understood by the term, consist of the Gooseberry (*Ribes Grossularia*); Red Currant (*Ribes rubrum*); White Currant (*Ribes rubrum album*); Black Currant (*Ribes nigrum*); summer and autumn fruiting Raspberries (*Rubus Idaeus*), and the Loganberry (an American hybrid).

With perhaps the exception of the last named, all are very popular and extensively grown, the demand for the fruit while it is in season being very great. The Loganberry is cultivated principally in private gardens for the sake of the variety which its fruit affords.

All are of hardy constitution, easily cultivated, and succeed in all parts of the United Kingdom where soil and climatic conditions are favourable. They are extremely productive and the produce is put to many and diverse uses, such as the making of tarts, preserving, bottling, for dessert and even for medicinal purposes.

The Gooseberry is first ready for use, as the fruit possesses the good quality of being fit for consumption both in a green as well as in a ripe condition. The early large fruiting varieties are those generally grown to afford fruit in the first-mentioned state, as the berries attain a profitable size in advance of the early medium and small fruiting kinds. It is, however, among the latter, irrespective of season or period of ripening, that the majority of the highly-flavoured luscious sorts are found, and in many instances they are grown apart from the former so that they can be netted in and rendered immune from bird attacks.

Red, White, and Black Currants reach maturity before the Gooseberry, and, like the last, are, with the exception of the White Currant, in such great demand that the crops prove highly remunerative. Of the four, the Gooseberry is perhaps, from a commercial as well as a private point of view, the most valuable. The white variety is grown to a much more limited extent, and the fruit is, beyond dessert purposes, employed principally for mixing with the red kinds for clarifying in the making of jelly.

The cultural treatment necessary for the Gooseberry being similar to that required for the Red, White, and Black Currant, it is unnecessary to deal with each under separate headings. All are extensively cultivated in the form of bushes, but the Gooseberry, Red and White Currants are also now much grown as espaliers and as two, three, and five branched cordons for training on trellises in the open, against fences and outbuildings, and on garden walls having a north aspect, by which means the supply is, in the last-named instance, considerably prolonged. They are also in a few cases grown in the form of standards, the stems being about 4 ft. in height.

Bush trees are generally planted 4½–5 ft. apart in the rows, with a distance of 6 ft. between them. Two, three, and five branched cordons, 2 ft., 3 ft., and 5 ft. respectively, and standards 6–8 ft. apart when employed, as is generally the case, as ornamental specimens in borders on either side of a frequented footpath. Espaliers may stand 9 ft. apart from each other.

Bushes are usually, although not always, planted in breaks varying in number from a few dozens to several hundreds, according to the demand for the fruit.

The kind of soil best suited to the needs of the Gooseberry, Red, White, and Black Currants, is in the first three-named instances a rich well-drained loamy medium, and in the last case one of a moister or more retentive nature, but with care in preparation, such as in deeply digging and manuring on a liberal scale, most kinds of soils can be rendered suitable. Not only is it necessary to enrich the soil before planting to ensure vigorous growth, but manure in some form or other must, after the bushes are established and come into bearing, be afforded each year afterwards to maintain their fertility. This should be applied to the surface on the completion of pruning, and be buried or dug in just beneath the surface.

With the exception of the Black Currant, all should be accorded a light open position. The species just mentioned prefers and yields the heaviest crops when grown in a semi-shaded position or the coolest part of the garden, such as in the vicinity of a north wall or hedge.

The fruit is produced in the case of the Gooseberry on spurs and young wood of the previous season's growth, on spurs in regard to Red and White Currants, and on the strong young wood with respect to the Black Currant. The three first should have clean stems standing not less than 1 ft. above the soil level, so that the fruit may not be spoilt by being splashed with soil during rainstorms, while the last should be allowed to branch out freely from the base, and produce vigorous growths annually. In the essentials named it is seen that the cultivation of the Black Currant differs somewhat from that of other fruits under consideration.

Propagation is invariably effected by means of cuttings made from straight stout well-ripened shoots of the current season's production, selected at the time of pruning. These may be from 18–24 ins. in length, and, with the exception of those of the Black Currant, all buds except four or five at the tips should be removed from the cuttings to ensure clean stems and to avoid risk of suckers being pushed up from the base. As the last-named propensity is to be encouraged in the Black Currant, the removal of the buds in this instance is undesirable. The base of the cuttings should be cut close to a joint, and the tops shortened back if the wood is weak or in an immature condition. Autumn or early winter is the best time to plant the cuttings. Set them 6 ins. deep, 9 ins. apart, in rows 1 ft. asunder, in soil which has been previously manured and well dug. Planting may be performed with a dibber, and the soil should be made quite firm round every cutting.

In some instances all five buds left on the cuttings—Black Currants excepted—will break, in others but two or three. The shoots which will eventually develop from these breaks should be cut back the following autumn to form the bases of the main branches in the case of trees intended for bushes. All should then be lifted and transplanted 2 ft. apart in rows standing 3 ft. asunder. During the next season enough growths will result to furnish the foundation of the future heads, and in the year following will develop sufficiently to allow of their being planted in their permanent positions. For culture as Cordons, see article on *CORDON FRUIT TREES*.

To form Espaliers, take a tree having three shoots, train out the two lower ones horizontally and cut them back somewhat, leaving both of equal length. The third or central shoot should be trained upright, then cut it back, leaving it 1 ft. in length. The next year train out the leading shoots on the lowermost branches, cutting back all other growths to six leaves in July, and to three buds the following autumn. Train the leading growth on the central cut back shoot—which is now really a continuation of the stem—in an upright direction, and select two shoots immediately below it and train them out, one on either side at right angles to form another tier or pair of branches, continuing in this way each year until a sufficient number of branches has been secured. See also *ESPALIER MODE OF FRUIT CULTURE*.

The training as regards Cordons is best done with the aid of stakes. (Standards are usually formed by grafting scions of the Red and White Currant on single-stemmed plants of *Ribes aureum*.)

The Pruning, as regards established bushes of Red and White Currants, consists in cutting back all young shoots in summer or July to six leaves, and further shortening them to two or three buds in autumn or winter. Leave shoots intact where necessary for the filling of vacancies caused by accident or branches dying, and shorten them back in winter to where they are well ripened.

Black Currants need different treatment, the pruning being confined to thinning and cutting out as much of the old wood as possible, to make room for that produced during the past and previous season as well as to induce the production of vigorous growth in future.

Gooseberries which are to supply fruit in a green state are spur-pruned, a certain amount of well-placed young shoots being left as well on the bushes, the latter being merely tipped. In all other cases the young wood is spurred back to two and three buds. Those varieties of which the growth is of a drooping nature should be pruned so that the branches are well off the ground. In regard to the dessert kinds, the trees should be spur-pruned and the branches disposed widely distant from each other so that gathering may be conveniently done. The pruning of full-grown cordons is performed in the same way, *i.e.*, partly shorten back side-shoots and spur growths in summer and spur in closely to two or three buds in winter. Leave shoots where required to make good losses or to eventually replace decrepit and worn-out branches.

The Raspberry succeeds best in an open position in well-manured deeply dug soil of a loamy nature, but with attention to preparation in the manner described and in applying manure annually after the canes come into bearing, most kinds of soil can be rendered suitable to their needs.

As regards the cultivation of the summer fruiting varieties, several methods are practised, but that which finds favour generally is to plant the stools 18–24 ins. apart in rows 6 ft. asunder, and to train the canes to a wire trellis. Very heavy crops of fruit result by pursuing this method. The trellis should be provided with three or four wires running transversely, and be about 5 ft. in height.

Propagation is best effected by the young canes or offsets which are pushed up in abundance in the vicinity of the old stools. Dig these up in autumn and transplant 1 ft. apart in rows 2 ft. asunder, for one season, or they may be permanently planted at once. The canes should be cut down to within 6 ins. of the soil in February. The following autumn thin out, if necessary, the canes produced during the summer, dispensing with the the weakest and retaining the strongest, tying them temporarily to the wires. The following February give them a final look over, cut off the tips, and on this occasion tie them securely to the trellis. Once the stools are established a great number of shoots or young canes will push up around the stools and between the rows. Of these enough should be left to furnish a supply of canes close to the stool for fruiting in the succeeding year, and cut or hoe off the surplus. After the crop has been gathered the old fruiting canes should be cut out and the new ones of the current season's growth thinned, leaving the best ripened, strongest, and a sufficient number, so that when finally tied to the trellis in February they will stand from 8–9 ins. apart. Until then they need only be provisionally tied in to prevent them from being blown about and broken by rough winds, as well as for the sake of appearance. The tipping or cutting back should be done some 5 ins. or 6 ins. above the topmost wire. Digging, if indulged in at all between the rows, must be very lightly done or only sufficiently to bury the dressing of manure spread over the surface in the previous autumn. In a great many instances the ground is never dug from the time planting takes place until the plantation is broken up.

The autumn fruiting varieties,

unlike the preceding, bear on the canes produced during the summer months, consequently these, after they have fruited, are cut down to within a few inches of the ground the following February. In due course new canes are pushed up, which, when sufficiently advanced in growth, are thinned out and tied to the trellis 9 ins. apart. They will fruit abundantly in the autumn, the fruit proving very acceptable for various purposes at this season of the year. In all other respects cultivation and propagation are the same as for the summer fruiting varieties.

Much the same treatment is necessary for the *Loganberry*, with the exception that being of a more rampant habit of growth the trellis should be not less than 6 ft. to 8 ft. in height, as the canes or growths, being so vigorous, often attain a length of 10 ft. to 12 ft. These canes should also be trained and tied more widely apart on the trellis.

SELECT LIST OF BUSH FRUITS.

Currants: *Red and White.*—La Constante, La Versaillaise, Raby Castle, Red Dutch, White Dutch Cut Leaved, White Transparent, White Versailles.

Black.—Baldwin's or Carter's Champion, Black Naples, Boskoop Giant, Lee's Prolific.

Gooseberries: *Large Red Varieties.*—*Crown Bob, Dan's Mistake, Lancashire Lad, Lord Derby, Speedwell, *Whinham's Industry.

Small Fruited Red Varieties.—*Ironmonger, Keen's Seedling, Red Champagne, Warrington.

Large White Varieties.—Careless, King of Trumps, Lady Leicester, *Lancer, Transparent, Whitesmith.

Small Fruited White Varieties.—Bright Venus, Cheshire Lass.

Large Green Varieties. — Stockwell, Telegraph, Thumper.

Small Green Fruited Varieties.—Glenton Green, Gretna Green, Langley Gage, Pitmaston Greengage.

Large Yellow Varieties.—Catherine, Criterion, Gunner, *Keepsake, Langley Beauty, Leader.

Small Fruited Yellow Varieties.—Champagne, Golden Drop, Golden Gem, Golden Lion.

Those against which an asterisk is placed are a few of the best to grow for gathering from while the fruit is green.

Raspberries: SUMMER FRUITING VARIETIES. — *Red.* — Baumforth's Seedling, Hornet, Norwich Wonder, Superlative.

Yellow.—Antwerp, Guinea, Queen of England.

AUTUMN FRUITING VARIETIES.—Belle de Fontenay, November Abundance, October Red, October Yellow.—A. W.

See also *KINDS OF CROPS*.

NEW VARIETIES.

Blackberry, Himalayan.[1]—A free-fruiting sort, bearing large panicles of good sized berries.

Raspberry, Lloyd George.—A perpetual fruiting variety, of good size and excellent flavour.

BUSH HONEYSUCKLE. — A name applied to the genus DIERVILLA. See *SHRUBS*.

BUSH VETCH (*Vicia sepium*).—See *VICIA*.

BUSHEL, WEIGHT OF.—See WEIGHT OF BUSHEL in *ARITHMETIC AND GARDENING*.

BUSHES, PRUNING OF.—See *PRUNING FRUIT TREES*.

BUTOMUS (Nat. Ord. Alismaceæ). One species of this genus is well worth growing, namely, *B. umbellatus*, the FLOWERING RUSH, which bears pretty pink flowers in June, and averages half a yard in height. It is a hardy perennial aquatic, suitable for the wild or water garden, and once planted will look after itself.

BUTTER BEANS.—See DWARF WAX-POD, or BUTTER BEAN, in *BEANS*.

BUTTER BURR.—See *PETASITES*.

BUTTER DOCK (*Rumex obtusifolius*). See *RUMEX*.

BUTTER NUT.—See *NUT CULTURE*.

BUTTER-WORT.—See *PINGUICULA*.

---

[1] Probably a hybrid of continental origin. It does not come from the Himalayas.

BUTTERCUP.—See CREEPING BUTTERCUP in *WEEDS*.

BUTTERCUP OXALIS (*Oxalis cernua*). See *OXALIS*.

BUTTERFLY FLOWER.—See *SCHIZANTHUS*.

BUTTERFLY ORCHIS (*Habenaria bifolia chlorantha*).—See note at end of *HARDY ORCHIDS*.

BUTTON SNAKE-ROOT. — See *LIATRIS*.

BUTTON WOOD (*Platanus occidentalis*).—See *TREES*.

BUTTONHOLES, ROSES FOR.— See ROSES FOR BUTTONHOLES in *ROSES FOR ALL PURPOSES*.

BUXUS.—For the best species see *SHRUBS*.

BYE-LAWS *re* **FIXTURES.** — See *GARDENING LAW*.

BYTURUS.—See RASPBERRY MAGGOT or BEETLE in *INSECT PESTS*.

C

CABBAGE (*Brassica oleracea capitata*. Nat. Ord. Cruciferæ).—By making sowings at different periods, fully developed heads of cabbage of good quality may be had throughout our twelve calendar months. Fortunately, these useful plants thrive in almost any locality, and only in the event of a very prolonged and severe winter following a mild autumn, need much damage be expected from frost.

A greater diversity of size is found in these than in any other easily grown vegetable, fully grown hearts varying from an ordinary cocoa-nut to specimens over a yard across. The smallest varieties, in addition to being of much more rapid growth, are undoubtedly of superior table quality, and for this reason are recommended to those only having a small family to provide for. They will equally commend themselves to others who grow cabbage more particularly always to have a reserve to draw upon should a more important crop fail—an event quite likely to occur even in the best regulated gardens.

Culture.—Make the first outdoor sowing as early in March as the state of the ground allows, and, provided the variety sown is a suitable one, plants from this sowing will give firm hearts very early in July.

An April sowing of a larger variety should be at their best during the second week in August, while if plants from a sowing made about the middle of May are given good land and an open situation, excellent heads should be available throughout late autumn and the winter. Undoubtedly the heads produced in early spring are the most popular. These are obtained by sowing the seed of well-tried varieties in late July or early August of the previous year.

If seed is sown thinly, no pricking out or twice transplanting will be needed; but overcrowding in the seed-bed must be avoided, such having a very weakening effect upon the plants, and, of course, delaying the date of maturity of the hearts.

The best results are obtained by planting in heavily manured land, but quite good cabbage may be cut from plants put out after an earlier crop of something else has been taken without further manuring. In addition to being rich, the soil should also be made moderately firm, a loose, porous root-run favouring the production of extra large leaves and loose heads, which find but little favour with many cooks and growers.

When cutting the heads of these from plants of either sowing mentioned above, a little extra care should be taken always to leave a few large leaves on each stem. Then a good and continuous crop of side-shoots will push out and provide a most useful vegetable for many months afterwards.

The distance usually allowed between what are termed Spring Cabbage is 18 ins. from row to row and 15 ins. between the plants. The smaller growing varieties of these will, however, give good results if planted much more closely. Where the extra large varieties are grown for autumn use, 2 ft. each way will be quite little enough.

Varieties:—*For Early Sowing.*—All Heart, Beefheart, Defiance, Earliest of All, Harbinger, Imperial, Knight's Pointed Head, Mein's No. 1, Winningstadt.

For Spring Use.—April, April Queen, Early Offenham, Early York, Ellam's Early, Favourite, Flower of Spring, Harbinger, Manchester Market, Nonpareil.—F. R. C.

CABBAGE BLACK ROT.—See BLACK ROT OF CABBAGE in *DISEASES OF PLANTS.*

CABBAGE CATERPILLARS. — See under CABBAGE WHITE BUTTERFLIES in *INSECT PESTS.*

CABBAGE, CHINESE.—See *CHINESE CABBAGE.*

CABBAGE, CLUBROOT.—See CLUBROOT in *DISEASES OF PLANTS.*

CABBAGE LEAF AND STALK MINER. See *INSECT PESTS.*

CABBAGE MOTH.—See *INSECT PESTS.*

CABBAGE, RED or PICKLING.—See *RED CABBAGE.*

CABBAGE ROOT FLY.—See *INSECT PESTS.*

CABBAGE ROSES.—See under PROVENCE ROSES in *ROSE CLASSES.*

CABBAGE, SAVOY (*Brassica oleracea bullata major.* Nat. Ord. Cruciferæ).—This forms a very reliable winter crop, and, except during the most severe weather, it may be depended upon to withstand the winter better than most green crops.

Culture.—Seed may be sown from 15th March to 31st May. Similar treatment to ordinary cabbage will prove successful.

Cutting should not commence until November, a few slight frosts vastly improving the table quality.

Although it is usual to pull up the stem after the head is cut, in times of great scarcity of other greens this should be left in order that later shoots may push from the top. These form an acceptable vegetable. The small growing varieties mentioned here are of the best flavour, and should be grown by those having small gardens.

Varieties:—*Small.*—Dwarf Golden Globe, Early Ulm, Little Pixie, Sugar Loaf, Tom Thumb, Vienna Early.

Maincrop (*i.e.* large sorts).—Best of All, Green Curled, Latest of All, Norwegian, Ormskirk, and Perfection.—F. R. C.

CABBAGE TRIBE.—See *KINDS OF CROPS.*

CABBAGE WHITE BUTTERFLIES.—See *INSECT PESTS.*

CABBAGE WHITE FLY.—See *INSECT PESTS.*

CACALIA.—A synonym for ADENOSTYLES and EMILIA. See *ADENOSTYLES* and *TASSEL FLOWER.*

CACTI.

In every greenhouse from which frost can be excluded in winter a few at least of these fascinating subjects should be grown. They are unique amongst plants for the extended period over which they are capable of thriving without water—a fact which has earned for them the apt title of VEGETABLE CAMELS. They are extremely diverse in form, ranging from the miniature *Mamillarias* little larger than a thimble, covered with tiny symmetrically arranged spines and hairs, to towering *Cereus* and *Opuntias*, which may if wished be grown 7–8 ft. high. Cacti are as interesting in winter as in summer, affording a perennial attraction to the grower, and when they flower, although the period is as a rule brief in duration, this is compensated by the extreme brilliance of colouring and size of the blooms.

Soil.—A soil of which fibrous loam forms the greater portion, with a sufficient addition of coarse sand and soft brick rubble pounded into small pieces to ensure extreme porosity, is suitable for the majority of genera, though *Epiphyllums* and *Rhipsalis* appreciate an addition of one-third of peat to this. To test the suitable condition of the soil pour water on to the surface. If suitable, the water immediately disappears.

Potting.—Always pot in the spring during March and April, so that the plants may become thoroughly established before the winter. Never interfere, however, with a plant that is doing well in sound, sweet soil, unless this is too fully occupied by healthy roots. When potting, make the soil moderately firm, so that the plants are firmly anchored and do not wobble about. For several weeks after potting give a minimum of water, or the plants will rot off wholesale. Small growers, such as many of the *Echinopsis* and *Mamillarias,* which make but little root, should have the pots three parts filled with crocking material, thus avoiding a large bulk of unnecessary soil, which is liable to become sour. Small pieces of charcoal added to the compost are beneficial in obviating sourness. Special care when crocking the pots should be given for all varieties. Place one large piece over the drainage hole, then smaller pieces over this until one-third of the depth is filled.

Watering.—This is *the* point which determines success or failure, and it is always better to err rather on the side of too little than on the slightest excess. From the end of April to the middle of August should be made the growing season, during which all plants should be kept moderately moist. The first watering after the winter should be done by immersing the pots to the rim in water and allowing them to remain for eight hours so as to soak the whole ball completely through, as this cannot be done by pouring it on the surface. No more will be needed for a week, after which with more sunlight, longer days, and an increasing temperature, fuller supplies should gradually be given. In the height of the growing season, when the house is closed for the night, a light syringing overhead is beneficial; but always bear in mind that these are desert plants and therefore moisture must not be overdone. After mid-August all syringing must cease, and root-watering must be considerably reduced, so that the growth made becomes well ripened, otherwise flowering will not be satisfactory. From early October until April the majority of Cacti require merely enough water at widely separated intervals to prevent shrivelling.

Epiphyllums, Rhipsalis, and *Phyllocactus* need slightly different management. *Epiphyllums* and *Rhipsalis* must never become dust dry at any time if their culture is to be successful, though very much less moisture must be given in winter than summer. *Phyllocactus* need a liberal supply throughout their growing season, with occasional applications of weak liquid manure. They should be syringed freely overhead each afternoon until growth is completed, and be kept always in a light, airy position. All through the winter give them only just sufficient water to prevent shrivelling.

Shading.—Very little in this way is requisite, the majority revelling in the hottest sunshine; but *Epiphyllums, Rhipsalis,* and *Phyllocactus* appreciate a slight screening, just sufficient to break the light during the hottest hours. A roller-blind is the best, as this can be run up immediately the sun declines. If a wash-on shade must be used, let this be as thin as possible.

Pests.—Cacti are singularly free from pests, the most troublesome being *Mealy Bug*, which, where it obtains a footing on specimens covered with hair or spines, is difficult to dislodge. A wineglassful of paraffin and two ounces of soft soap thoroughly mixed with a gallon of water, and kept continuously stirred, should be used for syringing affected plants. Lay these on their sides, and syringe vigorously, allowing them to remain wetted for several minutes. Then syringe again with clear water, repeating this treatment on several consecutive days.

Rotting of the Tissues.—This, a so-called disease, is almost always due to errors in watering. It quickly reduces a large and handsome specimen considerably in size, or results in its untimely death. Directly rotting is noticed, cut out every particle of decay with your sharpest knife, and lay the plant on a shelf in a dry air for three or four days until the wound has callused over. Then treat as a cutting, taking extreme care to avoid excess moisture.

Propagation.—This is effected by seed, cuttings, and offsets. Seed is sown in spring in a compost of equal parts finely sifted loam and sand, covering the pot with a sheet of glass, and standing in a temperature of 65° F. Plenty of moisture is needed until the little plants attain some size, since during their infancy they are little more than globules of water, and a few hours' sun when dry will burn them up.

Cuttings can be formed of any portion of a plant, large or small, in summer, and will soon form roots if placed in sandy soil and sparingly supplied with water. They are best removed from the parent plant with a sharp knife, so as not to bruise the tissue, and laid on a shelf in the sun for a few days before potting. When the top portion of a columnar or globular plant is used as a cutting, the base of the old plant should be retained in its pot, and kept slightly moist, when it usually puts out numerous offsets. These last, which are thrown off with great freedom by many varieties, simply need detaching and potting, after which they are treated as regards watering, etc., as cuttings until established.

Varieties.—The following is a selection of desirable easily grown sorts :—

Cereus caespitosus.—A compact dwarf species forming a cluster of stems. The flowers are bright rose in colour, and very freely produced in early summer. Height about 8 ins.

C. flagelliformis.—The WHIP or RAT'S TAIL CACTUS, with long trailing growths which attain a length of 3–4 ft. Its flowers are bright cerise red, and are freely produced in spring or early summer, according to the temperature in which it is grown.

C. grandiflorus.—This is a night blooming variety, opening its magnificent flowers about July. It is very fragrant. The colour is pure white inside, and reddish-brown on the outer petals. The flowers open very rapidly at sunset, closing at sunrise the next morning. Height, 2½–3 ft.

C. polycanthus.—This has intensely red flowers, which appear in spring, and the plant remains in blossom over an extremely long period, as the buds continue to open one after another. Height, 10 ins.

C. speciossimus.—This is a splendid variety for small houses, as it can be trained against a wall, where it bears its glorious crimson flowers, shaded to purple at the centre, with great freedom in April and May. Height, 6 ft.

C. triangularis.—This has stout triangular stems which grow very rapidly, and are well adapted for training over a conservatory roof.

Its flowers, which are white, appear in autumn, and are 12–14 ins. in diameter.

Echinocactus cornigerus.—This is a sort with unusually broad spines, producing blood-red flowers in summer. Height, 10 ins.

E. mamillarioides. — This has brilliant yellow flowers, with a red band down the centre of each petal. It blooms in summer. Height, 5 ins.

E. minuscula.—This is a small grower, freely producing orange-scarlet flowers in spring. Height, 3 ins.

E. rhodophthalmus. — A species bearing deep crimson flowers in autumn. Height, 4–12 ins.

E. Simpsonii.—This plant is so thickly spined that it is commonly known as the HEDGEHOG CACTUS. It bears red flowers, which appear in summer at the apex of the stems. Height, 4 ins.

E. uncinatus.—This bears deep purplish-red flowers in March or April. They are in clusters at the tops of the stems, and a striking contrast is afforded by the yellow stamens.

Echinocereus candicans (Syn. *Cereus rigidissimus*). — This is a splendid species, with flowers which are bright purple at the edges shaded to white at the centre, and are 4 ins. in diameter.

Echinopsis cristata purpurea.—This is a most brilliant variety, which bears deep rose-coloured flowers in July. The plant is globe-shaped. Height, 1 ft.

E. oxygona.—This species bears lovely rose-coloured flowers from the ridges near the centre of the stem. Height, 8 ins.

Mamillaria applanta.—This is a dwarf grower, the flowers, which are white tinged with red, springing from the outside of the stem at the top and appearing in summer. The plant is covered with red berries at the same time as the flowers.

M. elegans.—This is a very compact silvery-spined species, which very rarely flowers, the attraction being in the silvery spines. Height, 2 ins.

M. elephantidens.—This species has masses of closely curving spines set in tufts of white wood. It bears flowers of bright violet with a white margin in the autumn. The inner circle of the petals are rose-pink with purple base, and the flowers measure 3 ins. across. Height, 1 ft. or more.

M. pusilla.—This is a splendid species in shallow pans, bearing yellowish-white flowers in May. Its masses of small clustering silvery spines and ruby-red berries are most effective in winter. Height, 2 ins.

M. stella aurata.—This variety is covered with golden starlike rosettes of spines, and it bears yellow flowers in spring. Height, 3 ins.

M. viviparus.—The whole plant is covered with purple and white spines. It is splendidly free flowering, the blooms being purple in colour, and appearing in May and June.

Opuntia ficus indica (PRICKLY PEAR, or INDIAN FIG).—This is a tall grower, bearing yellowish flowers all through the summer, followed by mawkish-tasting fruits. Height, 8–12 ft.

O. leucotrichia.—This species has long white hairs, and bears yellow flowers in June.

O. mesacantha macrohiza. — A practically hardy sort, which may be grown out of doors beneath the wall of a greenhouse with south aspect. It has very few light greenish-brown spines, and flowers very freely, the blooms being yellow in colour, and followed by brownish-green fruits.

O. micro-dasys.—This is a sort specially liable to attack by mealy bug, but very pretty. It has battledore-like growths covered with delicate tufts of golden-brown spines.

O. missouriensis.—This species is

hardy, and bears attractive large yellow flowers 3 ins. in diameter from May onwards.

O. rafinesquii.—This is a prostrate species. The flowers are sulphur in colour, 3 ins. across, and appear very freely on the margins of the growths from July to September. Height, 9 ins.

Pereskia aculeata (BARBADOS GOOSEBERRY or BLOOD APPLE).—This species bears transparent white flowers in panicles. The leaves resemble those of the orange tree, and the plant is useful for training on rafters or grafting other species in standard form. Height, 6 ft.

Phyllocactus. — All these have magnificent flowers of most intense colouring, and are very reliable annual bloomers in spring and early summer.

P. albus superbus.—This is the best creamy-white variety, and is very fragrant.

P. anguliger.—This bears small, very fragrant white flowers at the tips of the branches in December and January.

P. Edwardsii.—This is a garden hybrid, which bears red flowers of medium size.

P. Etoile de Poissy.—This is a garden variety, with orange flowers shaded violet.

P. Jules Schomberger.—This is an attractive deep blue garden variety.

P. phyllanthoides. — This is an especially free-flowering species, with rich rose flowers in early summer.

Pilocereus senilis (THE OLD MAN CACTUS).—This is densely covered at the top with long silky white hairs, which become grey with age, occasionally producing a few carmine-purple flowers.

Rhipsalis salinarcoides.—This is a sort which has thin angular stems and small tufts of hair when young. It bears small neutral-tinted flowers in spring, which are followed by long persisting pea-like berries, from which it derives its common name MISTLETOE CACTUS. Height, 1 ft.

H. W. C. W.

CACTUS DAHLIAS.—See DAHLIA SECTIONS AND VARIETIES in *DAHLIA: CULTURE OF.*

CÆNOPTERIS.—Now included in the genus ASPLENIUM, for which see *FERNS AND FERN GARDENING.*

CAESALPINIA.—For the best species see *SHRUBS.*

CAFFRE LILY.—See *KAFFIR LILY.*

CAKILE.—See *SEA ROCKET.*

CALABRIAN PINE (*Pinus pyrenaica*). See *TREES.*

CALAMAGROSTIS (Nat. Ord. Gramineæ).—This is a genus of weedy plants of no garden value whatever. The best known species is *C. epigeios,* the COMMON WOOD REED.

CALAMINT (*Calamintha.* Nat. Ord. Labiatæ). — This is not much grown, but it is somewhat ornamental and may well be included in big gardens. All the species are hardy and of very easy culture, thus they are good plants for beginners. See also article on *POTHERBS.*

Annual Species.—These are sown out of doors in a sunny site in late March or April. Only one species need be described here :—

Calamintha Acinos.[1]—A species with purplish-blue flowers which open in July. Its height averages about 6 ins.

Perennial Border Species. — We describe a few good sorts below :—

Calamintha caroliniana.—A bright red, scarlet, or crimson sort, vivid and attractive, blooming from June onwards. Height about 12 ins.

C. coccinea.—An attractive bright scarlet sort, blooming all the summer. Height, 12–24 ins.

C. grandiflora.—This is the species usually grown. There appear to be several forms of it. Authorities describe it variously as a red and a purple. The form we are familiar with is, however, a bright rose one. It blooms from July onwards, and averages about 1 ft. high.

---

[1] This is known as BASIL THYME.—EDITOR.

C. mimuloides.—An attractive sort, with flowers which are almost orange coloured. It blooms in June and July, and averages 18 ins. high.

Rock Garden Species.—Only one species is suitable for the rock garden. This thrives in sunny situations if set in gritty soil, and is propagated by seeds sown in the spring. It seeds itself readily if left alone.

Calamintha alpina.—A plant of neat habit producing purple flowers in June and July. Its height averages about 4 ins.

See also *POTHERBS*.

CALAMINTHA.—See *CALAMINT*.

CALAMPELIS.—Now included in the genus ECCREMOCARPUS.

CALANDRINIA (ROCK PURSLANE. Nat. Ord. Portulaceæ). — There are a number of hardy annual species of Calandrinia, but few are garden favourites. They are of lowly growth, and best suited to sunny positions in the rock garden, as the flowers open only under the influence of sunshine. *Calandrinia grandiflora*, the COMMON ROCK PURSLANE, bears rose-purple flowers in July, on plants 12 ins. high, and is doubtfully annual, but succeeds as such in light warm soils if sown in autumn or spring, as well as being a useful plant for dry walls. *C. Menziesii* (Syn. *C. speciosa*) bears rose-purple or crimson-purple flowers throughout the summer, and grows 9 ins. high. *C. umbellata* is probably a biennial, but nevertheless a charming little plant when treated as a hardy annual; it bears vivid rosy-crimson flowers about half an inch across, from July onwards, and averages about 6 ins. high. It must be remembered that Calandrinias thrive only in light, well-drained soil and sunny positions.—C. H. C.

[A number of stove species as well as greenhouse species have been described and are often listed in gardening dictionaries. We do not, however, consider them of sufficient importance to include them here.—EDITOR.]

CALANTHE.—See *ORCHIDS*.

CALATHIAN VIOLET (*Gentiana Pneumonanthe*).—See *GENTIANA*.

CALCEOLARIA (SLIPPER - WORT. Nat. Ord. Scrophulariaceæ).—Herbaceous perennials, for greenhouse and half-hardy treatment. Height, 9–24 ins. The best soil is fibrous loam two parts, old manure and leaf-soil one part each, and a little silver sand. Propagation is by seed or by cuttings.

Culture.—Calceolaria seed is very minute and should be sown thinly and only just covered with fine soil. The seed-pans must be heavily shaded till germination takes place, and the soil kept evenly moist. Towards the end of July is a good time for sowing, and the seedlings should be pricked out early and kept growing on without check. After potting off singly, the young plants must be given a further shift as soon as the roots reach the edges, and so on till the final potting into 7- or 8-inch pots. Thorough ventilation, a cool moist temperature, and cleanliness are essential to success. If aphis is troublesome, mild fumigation should be resorted to.

The true florists' calceolarias are the herbaceous species, and these are usually raised from seed and grown in a cool greenhouse. The shrubby species, on the other hand, are easily propagated from cuttings taken in autumn and wintered in a frost-proof frame, or glasshouse. These are widely used as bedding plants, and will bloom practically all summer.

Varieties.—Calceolarias are not usually sold as named sorts, but many brilliant colours are procured from a choice strain of seed, of which many seedsmen have their own.

J. L. G.

CALCEOLARIA: Rock Garden Species.—These are well worth growing, and are of tufted habit, deciduous, and will thrive in half-shady positions. They are propagated by division of the roots in the autumn and spring.

Calceolaria plantaginea.—Leaves large green, in rosettes close to the ground. Flowers yellow. Site half-shady. Soil well-drained gritty loam. Flowering Period, June to August. Height, 1 ft.

C. polyrrhiza.—Smaller than above, spreading by undergrowths. Flowers yellow, with brown spots. Flowering Period, June to August. Height, 9 ins.

CALCIUM.—This element is frequently referred to in this work. See *CHEMISTRY FOR GARDENERS*, *LIME*, *LIME COMPOUNDS*, etc.

CALCIUM CARBIDE REFUSE.—See CALCIUM CARBIDE IN *LIME COMPOUNDS*.

CALCIUM COMPOUNDS.—The chief are described in *LIME COMPOUNDS*.

CALENDAR.

A Calendar covering Greenhouse Work, Hardy Fruit Work, Indoor Fruit and Vegetable Work, and Outdoor Flower Gardening will be found as a supplement at the end of the volume.

CALENDULA.—See *MARIGOLD*, and under MARIGOLD in *MEDICINAL HERBS*.

CALICHE.—See under FORMS OF SODA in *SODA AND SODIUM COMPOUNDS*.

CALICO AS GLASS.—See *GLASS SUBSTITUTES*.

CALICO BUSH (*Kalmia latifolia*).—See *SHRUBS*.

CALIFORNIA LILAC (*Ceanothus thyrsiflorus*).—See *SHRUBS*.

CALIFORNIA NUTMEG (*Torreya californica*).—See *TREES*.

CALIFORNIAN ALLSPICE (*Calycanthus occidentalis*).—See *SHRUBS*.

CALIFORNIAN BLUEBELL.—See *NEMOPHILA*.

CALIFORNIAN CARPENTARIA (*Carpentaria californica*).—See *CLIMBING AND TRAILING PLANTS*.

CALIFORNIAN FUCHSIA.—See *ZAUSCHNERIA*.

CALIFORNIAN FUCHSIA CURRANT (*Ribes speciosum*).—See *CLIMBING AND TRAILING PLANTS*.

CALIFORNIAN POPPY (*Platystemon.* Nat. Ord. Papaveraceæ).—In warm and sunny gardens this hardy annual, botanically known as *Platystemon californicus* (Syn. *P. leiocarpus*), is a very cheerful plant, about 9 ins. high, with pale yellow flowers carried on slender stems. The best results are obtained by sowing in the open ground in spring or autumn, and thinning the seedlings so that they stand 4–6 ins. apart. It is most effective when grown in groups, and sows itself freely.

C. H. C.

[This must be carefully distinguished from Eschscholzia, which is sometimes known as the Californian Poppy.—EDITOR.]

CALIFORNIAN REDWOOD (*Sequoia Sp.*).—See *TREES*.

CALIFORNIAN TREE POPPY (*Romneya trichocalyx*).—See *SHRUBS*.

CALIFORNIAN or WESTERN ALLSPICE (*Calycanthus occidentalis*).—See *SHRUBS*.

CALIFORNIAN YEW (*Taxus brevifolia*).—See *TREES*.

CALIMERIS.—Now included in the genus *ASTER*.

CALLIANTHEMUM (Nat. Ord. Ranunculaceæ).—Closely related to Ranunculus. Only one species is usually grown. This requires a well-drained gravelly loam, and is propagated by division of the roots in the autumn. It may be also raised by means of seed sown as soon as ripe.

C. rutaefolium (Syn. *C. anemonoides*).—A dwarf, hardy perennial rock plant, with Rue-like leaves in rosettes. Flowers white, tinged with purple when old. Site half-shady. Flowering Period, May to June. Height, 4 ins.

CALLICHROA.—Now included in the genus LAYIA.

CALLIOPSIS.—See *COREOPSIS.*

CALLIPRORA.—Now included in the genus *BRODIAEA.*

CALLIPTERIS.—Now included in the genus ASPLENIUM, for which see *FERNS AND FERN GARDENING.*

CALLIRHOË.—See *POPPY MALLOW.*

CALLUNA.—See *HEATHS* and *SHRUBS.*

CALLUS. — See *PROPAGATION OF PLANTS* for explanation of this term.

CALOCHORTUS. — See *MARIPOSA LILIES, or STAR TULIPS.*

CALOPHANES (Nat. Ord. Acanthaceæ).—This is not widely known or widely grown, but comes in as a hardy perennial for the herbaceous border.

Culture.—This requires the usual treatment given to other hardy perennials. It may be successfully grown out of doors in a sandy soil to which some peat has been added. It may be planted in the autumn or spring, and is increased by division of the roots in February.

What to Grow.—Only one sort has come to my notice as being worthy of cultivation. Future research may show the presence of others. The species in question (*Calophanes oblongifolia*) bears a blue flower dotted with violet or purple. It blooms from August onwards, and averages about 12 ins. in height.

CALOSCILLA.—Now included in the genus *SCILLA.*

CALTHA (MARSH MARIGOLD. Nat. Ord. Ranunculaceæ).—This is a genus of hardy herbaceous perennials more suitable for the water garden than the borders, though they will succeed in the latter site if kept very moist. The best known species is *C. palustris.* See MARSH MARIGOLD in article on *WATER GARDEN: PLANTS FOR THE.* *C. polypetala* is a new species well worthy of culture. It bears large yellow flowers in May, and grows 1–2 ft. in height. This plant must be carefully distinguished from a plant of similar name, MARSH MALLOW (*Malva sylvestris*), an important medicinal plant described under MALLOW in our article on *MEDICINAL HERBS.*

CALVARY CLOVER (*Medicago Echinus*).—See *MEDICAGO.*

CALYCANTHUS.—For the best species see *SHRUBS.*

CALYSTEGIA (BEAR-BIND. Nat. Ord. Convolvulaceæ).—This is a rather large genus of hardy and half-hardy perennial or evergreen twiners and trailers of little garden value. Probably the most suitable as well as the most attractive is *C. Soldanella,* a flame-coloured June and July blooming plant about 12 ins. high, though *C hederacea plena* (Syn. *C. pubescens*) is a good dwarf rose-coloured twiner. *C. sepium* is the well-known weed the GREATER BINDWEED or COMMON BEAR-BIND, a most troublesome plant the best means of dealing with which will be found described in our article on *WEEDS* under the former name.

See also *CLIMBING AND TRAILING PLANTS.*

CAMASSIA (QUAMASH. Nat. Ord. Liliaceæ).—This is a hardy bulbous plant from North-West America, which flowers in late spring or in summer. The blooms are borne on erect, somewhat slender stems, which vary in height from 1–3 ft., and as they are invariably of some shade of blue, mauve, or white, they make pleasing and somewhat unusual variations in a mixed border. As the different varieties seed freely in a warm summer, and as the young seedlings vary considerably in their colour and habit, it is worth while trying to raise one's own seedlings.

Culture.—Camassias are naturally at home in rich meadows, which are moist during winter and spring, but rather dry in summer. Under cultivation they like a good loam inclining to the stiff side and enriched with leaf-mould and old manure, but they will thrive in any good border soil. The bulbs should be planted in September or October at a depth of about 4–6 ins., and they may be left undisturbed for several years.

Seed should be sown thinly in drills in a bed where the seedlings may remain for two years, when they may be transferred before new growtn commences to another seed bed. Here they may remain until they flower, which will probably be in their third or fourth year from seed, and the best varieties picked out for border decoration. Seed should be sown soon after it is ripe.

Varieties :—*Camassia Cusickii.*—The large bulb is very characteristic. The flowers, which are of a delicate pale blue or mauve, open in June or early July, and are borne on stems often 3 ft. high.

C. esculenta.—This is the typical Quamash of the Indians, who eat the bulbs when baked. The flowers vary in colour from almost white to a deep blue, and twenty to forty are usually borne (in June) on one stem. The height is 1½–2½ ft. Fancy names have been given to some of the best of the seedlings.

C. Fraseri (WILD HYACINTH).—This bears lovely sky-blue flowers in May or June, on plants 1½ ft. high.

C. Leichtlinii.—This bears creamy-white flowers in May, and averages 3–6 ft. in height.—J. J. & E.

CAMBIUM.—For explanation of this term see under GROWTH in *PLANT PHYSIOLOGY.*

CAMBRIDGE BLUE GRAPE HYACINTH (*Hyacinthus azureus*).—See *GRAPE HYACINTH.*

CAMELLIA (Nat. Ord. Ternstroemiaceæ).—This is an evergreen flowering shrub, hardy in the milder parts of Britain, averaging 3–20 ft. or more in height. For growing in pots or tubs, a good compost is medium turfy loam and peat in equal proportions, kept porous with plenty of sharp silver sand. A peaty loam is most suitable for outdoor culture. Propagation may be effected by seed, grafting, or layering, the two latter methods being most suitable for amateurs.

Culture.—Grafting is best done in the early spring, the stock usually employed being *C. japonica*, this being the hardiest species. Maiden plants of this stock should be cut down to within 2 or 3 ins. of the base, and the selected variety grafted thereon.

USES.—As the Camellia blooms early (February to May), the flowers are frequently ruined by frost in the open. The plants are, therefore, more suited for conservatory decoration, either set out in beds or placed in large pots and tubs.

Varieties.—The best of the species are probably *C. japonica magnoliaeflora* and *C. reticulata.* Of garden hybrids the following are excellent, prominence being given to the now fashionable single-flowered sorts: Alba plena, Alba simplex, Apollo, Donckelaarii, Jupiter, Snowflake, and Waltham Glory.—J. L. G.

See also *CLIMBING AND TRAILING PLANTS* and *SHRUBS.*

CAMPANULA (BELLFLOWER or BELLWORT. Nat. Ord. Campanulaceæ).—This genus contains omething like two hundred and thirty species of annual, biennial, or perennial flowers, mostly the latter. In the present work it will be impossible to describe more than a very small proportion of those specially worth commendation.

Annual Species.—Only a few of the hardy annuals need be troubled about by the everyday gardener. The following, however, are exceedingly beautiful :—

Campanula drabaefolia.—This is a Grecian plant of lowly growth, and its variety *attica*, often listed as a separate species, is the best to grow. It produces a dense mass of purple-blue flowers all the summer, and grows about 4 ins. high. Seed may be sown in the spring or autumn, in the flowering positions. There is a white variety called *alba*.

C. Erinus.—This is a suitable annual for the rock garden. It produces rosy-blue flowers throughout the early and late summer on stems which branch very freely, and its height is about 6 ins.

C. macrostyla.—This is a most distinct species having stiffly-branched stems and producing glorious purple flowers veined with violet, from July onwards. Its hardiness is doubtful, and thus it should be given a warm position. Its height is 18 ins.

C. ramosissima.—This is a useful annual for the border, producing blue flowers with a white base freely during the summer. It grows about 9–12 ins. in height.—C. H. C.

Biennial Species.—These require the usual treatment for biennials and are useful for the border or rockery.

Campanula sibirica.—This produces bluish-violet flowers from July onwards, and grows 12–18 ins. in height. The variety *divergens* is preferable to the type.

C. thyrsoides.—This bears attractive sulphur or pale yellow flowers from July onwards, and grows about 12–18 ins. in height.

Perennial Border Species.—These and the rock garden species to follow are the most important, thriving as they do in a great variety of soils. A large number of them, such as *Campanula glomerata*, *C. lactiflora*, *C. latifolia*, and *C. persicifolia*, are equally as happy under deciduous trees in woodlands as they are in the perennial border. Where the soil is heavy all Campanulas should, however, be planted in as open sunny spots as possible. Propagation is easily effected by seeds, cuttings, offsets, and division of the roots, and the seed, which is very small, is best sown in pots, pans, or boxes of finely sifted sandy soil during May or June, the resulting plants being pricked off in frames of light soil and protected from slugs. Spring planting is the best, and small plants should not be put out of doors too soon. Division of the roots, however, is by far the most satisfactory and speedy method of increasing one's stock. The following is a selection of the best species :—

Campanula alliariaefolia. — This pretty species has heart-shaped leaves, and produces long creamy-white, bell-shaped drooping flowers from June to July. Height, 2–3 ft.

C. americana.—This erect species, with egg-shaped leaves, bears blue flowers in July, and grows 3–6 ft. high.

C. betonicaefolia. — This very branching species has long, oblong, egg-shaped leaves, and produces attractive blue-purple flowers in May. Height, 1½ ft.

C. bononiensis.—The lower leaves of this attractive species are heart-shaped, and its violet-blue flowers are produced in July. *C. b. alba* is white, and both grow 2–3 ft. high.

C. celtidifolia.—A synonym of *C. lactiflora*, which see.

C. collina.—The dark blue funnel-shaped flowers of this are produced in July, and the plant grows about 1 ft. high.

C. glomerata.—This useful sort, the lower leaves of which are egg-shaped, produces attractive blue-purple flowers of medium size from May to September. The following are good varieties of it:—*alba* (white); *dahurica* (violet-purple); and *pusilla* or *acaulis* (blue); and all grow 1–2 ft. in height, except the last-named, which grows only 1–2 ins.

C. grandis.—A synonym of *C. latiloba*, which see.

C. lactiflora (Syn. *C. celtidifolia*).—This attractive sort bears milky-white flowers shaded with light blue, though pure white and sky-blue varieties have also been raised. The bloom is produced from July to September, and the height varies from 2 ft. to 6 ft.

C. latifolia. — The purple-blue flowers of this sort are narrowly bell-shaped and are freely produced from June to August. The following are useful varieties:—*alba* (white); *Burghalti* (lavender-blue); *macrantha* (royal purple); *Van-Houttei* (dark blue); and *versicolor* (light and dark purple). All grow from 2 ft. to 4 ft. in height.

C. latiloba (Syn. *C. grandis*).—This attractive sort produces light blue flowers in dense clusters during June or July, and its variety *alba* is pure white. Both grow 1–3 ft. high.

C. longistyla. — This useful sort bears blue-purple bell-shaped flowers from June to September, and grows 2–2½ ft. high.

C. lyrata.—The numerous attractive blue flowers of this sort are produced in June, on plants growing 1–2 ft. high.

C. Medium. See article on *CANTERBURY BELLS*.

C. nobilis.—A synonym of *C. punctata*, which see.

C. peregrina.—The flowers of this are similar to those of *C. latiloba* in some respects. They are light blue, with a dark centre, and are produced in July, on plants 2½ ft. high.

C. persicifolia. — The nodding flowers of this sort are blue and widely bell-shaped. They are produced from July to September, on plants 1–3 ft. high. Garden varieties, both single and double, are very numerous.

C. phyctidocalyx.—This produces rich dark blue-purple widely bell shaped flowers from May to July. Its height is 2–3 ft.

C. primulaefolia.—The flowers of this sort are densely arranged after the style of *C. latiloba*. They are blue or purple and are produced in July, on plants 1–3 ft. high.

C. punctata (Syn. *C. nobilis*).—This bears reddish-purple, cream, or white spotted flowers in July, on plants 1½–2 ft. high.

C. pyramidalis. See article on *CHIMNEY BELLFLOWER*.

C. rapunculoides. — This plant must be kept away from other choice subjects as it spreads rapidly. Its blue-purple flowers are freely produced from June to August, on plants 2–3 ft. high.

C. Rapunculus. See article on *RAMPION*.

C. sarmatica.—This useful sort bears pale blue or purple bell-shaped flowers in July, on plants 1–2 ft. high.

C. speciosa.—This most useful sort bears purple and white flowers of medium size in a pyramid on the upper part of the unbranched stem. Its flowering period is June and July, and its height 1–2 ft.

C. Trachelium (NETTLE LEAF BELLFLOWER).—This attractive sort bears blue-purple bell-shaped nodding flowers in small clusters at the top of its stem from June to September. The best double varieties are:—*alba plena* (white); and *caerulea plena* (blue); both of which grow 1–3 ft. high.

C. versicolor.—The flowers of this are pale violet at the tops, purplish in the middle, and dark violet at the base. They are produced from July to September, and are widely bell-shaped and very attractive. The height of the plant varies from 3 to 4 ft.—J. F.

Rock Garden Species.—Most of these thrive in half-shady situations if planted in well-drained, sandy loam, and as a rule they are easily propagated by division of the roots in the spring, or by seed sown in gentle heat in March. The following is a selection of the most useful sorts, those difficult to grow being purposely omitted:—

Campanula abietina.—This has tufted leaves forming a mat. Flowers light blue on branching stems. Site, half-shade. So rich, gritty loam. Flowering Period, May to July. Height, 9 ins.

C. acutangula.—Syn. *C. arvatica*, which see.

C. Allionii.—This spreads by underground runners, bearing leaves in tufts, and large solitary bluebell-like flowers. Site sunny. Soil very gritty or morainic. Flowering Period, June to July. Height, 3 ins.

C. alpina.—This bears leaves in rosettes. Flowers light blue on branching stems. Site sunny. Soil morainic. Flowering Period, July to August. Height, 4 ins.

C. arvatica (Syn. *C. acutangula*).—This spreads by underground runners and has small ivy-like leaves close to the ground. Flowers lilac or purple, wide open. Site, half-shade. Soil very gritty or morainic. Flowering Period, May to July. Height, 2 ins.

C. carpatica.—This has leaves in large tufts and is a free grower. Flowers blue to white. Site, sun or half-shade. Soil rich, gravelly loam. Flowering Period, May to September. Height, 1 ft.

C. excisa.—This spreads by underground runners. Leaves narrow on wiry stems. Flowers blue, drooping, perforated. Site sunny. Soil very gritty or morainic. Flowering Period, June to August. Height, 3 ins.

C. garganica.—This is a free-growing dwarf plant with small ivy-like leaves. Flowers blue, with white centre, starlike and freely produced. Site, half-shade. Soil rich gritty loam or crevice. Flowering Period, May to August. Height, 3 ins. The variety *alba* has white flowers, and the variety *hirsuta* has hoary leaves.

C. muralis.—Syn. *C. Portenschlagiana*, which see.

C. planiflora.—This is a small counterpart of *C. persicifolia.* Flowers large blue. Site sunny. Soil rich gritty loam. Flowering Period, July to August. Height, 8 ins.

C. Portenschlagiana (Syn. *C. muralis*).—This is one of the best dwarf species, and is of tufted habit. Flowers blue-purple in long racemes. Site, half-shade in rock crevices. Soil gritty. Flowering Period, June to August. Height, 4 ins. The variety *bavarica* has larger flowers.

C. pulla.—This is one of the choicest kinds. Flowers deep rich violet almost hiding the foliage. Site, half-shade. Soil rich and well drained, gritty. Flowering Period, June to September. Height, 3 ins.

C. pusilla (Syn. *C. pumila*).—This is a free-growing species, spreading by underground runners and coming up freely from self-sown seeds. Flowers blue to white. Site, half-shade. Soil gritty or rock crevice. Flowering Period, June to September. Height, 3 ins.

C. Raineri.—This is a rare plant. Flowers saucer shape, deep blue and borne on short leafy stems. Site, half-shade. Soil morainic. Flowering Period, June to July. Height, 3 ins.

C. rhomboidalis.—This is a bushy plant with leafy stems. Flowers blue. Site, half-shade. Soil moist. Flowering Period, June to July Height, 1 ft.

C. rotundifolia (HARE-BELL).—This has wiry branching stems, and is very useful for the rock garden. Flowers deep blue to white. Site, half-shade. Soil gritty loam. Flowering Period, June to September. Height, 1 ft.

C. Stansfieldi.—This is very free flowering. Flowers violet-blue on branching stems. Site, half-shade. Soil gritty. Flowering Period, June to July. Height, 4 ins.

C. Tommasiniana.—This has a mass of wiry stems clothed with narrow leaves. Flowers pale blue, pendent in long racemes. Site sunny. Soil gritty or rocky crevice. Flowering Period, July to August. Height, 6 ins.

C. Waldsteiniana.—This grows into neat little bushes of wiry stems. Flowers pale blue. Site, half-shade. Soil gritty loam or rock crevice. Flowering Period, June to July. Height, 3 ins.

C. Zoysii.—This is a choice little gem making a compact bush-like plant. Flowers curious shape, azure blue. Soil morainic or very gritty and well drained. Flowering Period, June. Height, 3 ins.—W. I.

NEW VARIETIES.

Campanula Abundance. — This bears light blue flowers, several on a stem, and grows 6–8 ins. high. It is suitable for pot or rock garden culture.

C. cenisia alba.—This is a pretty white subject for the rock garden, growing 1 in. high.

C. Chastity.—This bears white bell-shaped flowers, and is of erect habit, growing 6 ins. high. It is best grown in pots.

C. Enchantress.—This is a pale mauve sort growing 6 ins. high, and most suitable for the rock garden.

C. garganica W. H. Paine.—This bears blue flowers with a white eye. It is a trailer suitable for the rock garden.

C. Meteor. — This bears white flowers with a violet eye, on plants 4 ins. high. It is best grown in pots.

C. Norman Grove.—This bears light blue bell-shaped flowers, and grows 3 ins. high. It is suitable for pot and rock garden culture.

C. persicifolia Telham Beauty.—This bears deep lavender flowers, on plants 3½ ft. high.

C. Phyllis Elliott.—This bears erect, bell-shaped violet-blue flowers about an inch across, and grows about 3 ins. high. It is best grown in the rock garden.

C. pusilla Miss Willmott.—This bears pale violet-blue flowers twice the size of the type. It grows 3–4 ins. high, and is suitable for rock garden culture.

C. tomentosa Maud Landale.—This bears rosy-purple funnel-shaped flowers and felted leaves. It grows 6–12 ins. high, and is suitable for rock garden culture.—W. J. C.

CAMPERNEL (*Narcissus odorus*).—See *NARCISSUS SPECIES.*

CAMPION.—A name applied to *SILENE*, which see ; also *LYCHNIS.*

CAMPTERIA.—Now included in the genus PTERIS. See *FERNS AND FERN GARDENING.*

CAMPTOSORUS. — See *Scolopendrium rhizophyllum* in *FERNS AND FERN GARDENING.*

CAMPYLONEURON.—Now included in the genus POLYPODIUM, for which see *FERNS AND FERN GARDENING.*

CANADA MOONSEED (*Menispermum canadense*).—See *CLIMBING AND TRAILING PLANTS.*

CANADA PLUM (*Prunus nigra*).—See *TREES.*

CANADIAN ELDER (*Sambucus canadensis*).—See *TREES.*

CANADIAN FLEABANE.—See under ERIGERON in *MEDICINAL HERBS.*

CANADIAN LILY (*Lilium canadense*). See *LILIES.*

CANADIAN RED PINE (*Pinus resinosa*). See *TREES.*

CANADIAN WHORTLEBERRY (*Vaccinium canadense*).—See *SHRUBS.*

CANADIAN YEW (*Taxus canadensis*). See *TREES.*

CANARY CREEPER (*Tropaeolum aduncum,* or *T. peregrinum*).—See *NASTURTIUM* and *CLIMBING AND TRAILING PLANTS.*

CANARY GRASS (*Phalaris canariensis*).—See *PHALARIS.*

CANARY REED.—See *PHALARIS.*

CANDLE RUSH (*Juncus effusus*).—See *JUNCUS.*

CANDYTUFT (*Iberis.* Nat. Ord. Cruciferæ).—The immensely popular annual Candytufts are easily grown from seeds sown in the open ground in March; and their cultivation presents few difficulties. Lime in the soil and a sunny position are two essentials. As the seedlings make tap roots they resent being transplanted, and should therefore be raised where they are to flower, and thinned out in due course. Florists have raised several distinct types known as Hyacinth-flowered, Rocket, and Spiral, and have produced a modest range of colouring. The two best annual species are described below :—

Iberis amara (Syns. *I. arvatica, decipiens, Forestierii,* and *ruficaulis*). —The native BITTER CANDYTUFT white, and summer-flowering. The progenitor of the handsome large-flowered Spiral and Hyacinth-flowered strains. Height, about 10 ins.

I. umbellata (Syns. *I. coronaria, corymbosa, hortensis, pulchra,* and *Raynevalii*).—A purple, summer-flowering sort, native of Southern Europe. From this species and its forms the pink, rose, carmine, blush, crimson, and rich purple garden varieties have been produced, as well as the fine Rocket Candytufts. Height, 1 ft.

Rock Garden Species.—These are free-flowering, mostly perennial, plants with evergreen foliage, thriving in any open sunny place in the rock garden. They are propagated by division of the roots in the autumn or spring. The five best are briefly described :—

Iberis correaefolia.—A plant of shrubby habit, with evergreen foliage. Flowers white. Site sunny. Soil sandy loam. Flowering Period, May to June. Height, 1 ft.

I. gibraltarica.—This also is shrubby. Flowers rosy-lilac. Site sheltered, sunny. Soil sandy loam. Flowering Period, December to January. Height, 1 ft.

I. saxatilis.—A very drawf bushy plant. Flowers white. Site sunny. Soil sandy loam. Flowering Period, May to June. Height, 3 ins.

I. sempervirens (EVERGREEN CANDYTUFT).—A sort forming dwarf bushes or pendent curtains covered with snow-white flowers. Site sunny. Soil sandy loam. Flowering Period, May to June. Height, 1–3 ft. There are many varieties of this, including *garrexiana.*

I. Tenoreana.—A free-flowering annual species. Flowers pale rosy-lilac. Site sunny. Soil sandy loam. Flowering Period, spring and autumn. Height, 6 ins.

CANKER.—See APPLE CANKER in *APPLE DISEASES.*

CANKER DISEASES.—See *DISEASES OF PLANTS.*

CANKER IN TOMATOES.—See TOMATO CANKER in *TOMATO DISEASES.*

CANKER LETTUCE (*Pyrola rotundifolia*).—See *PYROLA*.

CANKER WORMS.—See under WINTER MOTHS in *INSECT PESTS*.

CANNA (Nat. Ord. Scitaminaceæ). These were formerly treated as stove plants, but are really half-hardy perennials. Height, 2–5 ft. A rich, loose, loamy soil with plenty of humus suits them, and they are propagated by seed, and division of the rootstocks. (The latter is the usual method of increase and the only way to perpetuate the named varieties.)

Culture.—Seed, which should be soaked in warm water for some hours before sowing, requires a fairly high temperature for germination. Sow in February or March in pots, burying the seeds about ½ inch deep in light, well-drained soil. A brisk hotbed giving a bottom temperature of 75° F. will hasten the seedlings into growth. Pot off singly as soon as the young plants can be handled. Root divisions are potted up in 5-inch pots in spring, where, in a warm house, they will soon start into vigorous growth. If for growing in beds in the open, they are planted out in June in heavily manured sites where frequent watering can be given during dry weather. For pot culture shift the plants into 10- or 12-inch pots, using very rich soil. When well established, and the roots are beginning to fill the pots, weekly applications of dilute liquid manure will be appreciated.

Winter treatment is similar to that required by the *DAHLIA* (which see). The time of flowering is late summer and throughout autumn.

Varieties.—Alphonse Bouvier, Baron de Richter, Black Prince, Duc Ernst, Elizabeth Hoss, Evolution, Gaekwar of Baroda, J. B. Van der Schoot, Jupiter, King Humbert, Meteor, Niagara.—J. L. G.

CANNERIES, REFUSE FROM. — See REFUSE FROM CANNERIES in *FISH AS MANURE*.

CANNING FRUIT.

Is home canning of fruit and vegetables a very difficult matter? This question so often asked may be answered in the negative, as long as attention is strictly paid to the important detail of expelling the air from the cans and complete sterilisation. We propose to give a few hints on how this important operation of home canning may be carried out.

Apparatus Needed. — Simple apparatus as in the list below is required:—One thermometer; one canner or boiler, or a very large pan; a supply of suitable cans and lids; a pair of tongs for removing hot cans; one camel-hair brush; two soldering-irons, and a supply of flux and sticks of solder; a large bucket; a level table; a good file; and an abundant supply of both hot, cold, and boiling water will also be needed.

How to Can.—The operation of canning may be divided into six different heads.

First.—Sorting and cleaning of the fruit and vegetables.

Second.—Packing the cans.

Third.—Filling up the cans with water or syrup.

Fourth.—Sealing the cans, and exhausting the air inside.

Fifth.—Sterilising or processing; and

Sixth.—Cooling the cans and testing for leakages.

Before starting to can any fruit or vegetables thoroughly scald all the cans in boiling water. Next get the water in the canner or boiler up to 212° F., and see that the soldering-irons are quite clean and free from rust. It is necessary to heat the soldering-irons till they are nearly red-hot, and the copper tip of each must be plainly visible. The irons are then dipped into the flux, touched with a stick of solder, and again dipped quickly into the flux, after which the solder will run evenly on the surface.

As regards the fruit or vegetables, those which are perfectly fresh, and not overripe, but in the best possible condition, should be chosen. Pack into clean cans to within about a quarter of an inch of the top, and fill up the cans with boiling water or syrup so as just to cover the fruit. Then immediately put on each lid and solder down, afterwards sealing up the tiny vent-hole in the centre of the lid.

The cans are now ready to go into the canner to be sterilised. The lengths of time necessary for processing are given in a table farther on. The time necessary for complete sterilising must be calculated from when the thermometer again reaches 212° F., as, of course, the temperature falls at once when cold cans are put into the canner.

When the prescribed time is up, each can should be carefully removed and put into a bucket of cold water, which prevents the fruit from becoming "mushy."

Both fruit and vegetables are usually prepared for canning in exactly the same way as for bottling (see article on *Fruit Bottling and Preserving*), but the borax mixture for keeping peas a good colour is usually omitted from the canned produce. It should be noted that Rhubarb and Beetroot are not satisfactory for canning.

All cans should be labelled immediately to avoid confusion, and stored in a cool dry place after being examined in the usual way for leakages.

Time Required.—The following are suitable times for sterilising when canning :—

Apples . .	10–20 minutes.
Apricots . .	15–20 minutes.
Asparagus . .	Intermittent.[1]
Beans . . .	Intermittent.
Blackberries. .	12–20 minutes.
Carrots . .	120 minutes.
Cherries . .	20 minutes.
Cooking Pears .	30 minutes.
Currants . .	12–20 minutes.
Damsons . .	12–20 minutes.
Gooseberries .	12–20 minutes.
Mixed Vegetables .	2 hours or Intermittent.
Peaches . .	15–20 minutes.
Pears . . .	10–20 minutes.
Peas . . .	Intermittent.
Plums . . .	12–20 minutes.
Raspberries . .	12–20 minutes.
Strawberries. .	12–20 minutes.
Tomatoes . .	20–30 minutes.

Thorough sterilising, we may again insist, is essential to success.

E. C.

CANOE BIRCH (*Betula papyrifera*).—See *Trees*.

CANOE CEDAR (*Thuya plicata*).—See *Trees*.

CANTERBURY BELLS (*Campanula Medium*. Nat. Ord. Campanulaceæ).—This is one of the most popular races of biennial Campanula, and has given rise to a great number of varieties, bearing numerous large and handsome flowers, ranging in colour from white, blush, and pink, to rose, mauve, blue, purple, and striped. Besides the ordinary single forms there are double, or hose-in-hose varieties, and the cup-and-saucer strain (*C. Medium calycanthema*), in which the calyx has become expanded like a large saucer under each flower, and is coloured like the corolla.

Culture.—Seeds of any of these may be sown in a bed of finely raked soil in the open garden during May or June; but better results are ensured by sowing thinly in boxes in May, June, or July, and rearing the seedlings in a cold frame, where they will be safer from the slug pest and other enemies. When a few rough leaves have been made, transplant the seedlings into a nursery bed of good soil, 12 by 4 ins. apart. Plant them where they are to bloom, in autumn, the earlier the better. They bloom in June and July, and vary from 1-4 ft. high, according to the size of the plants and the fertility of the soil, making pyramids of bloom on branching stems. If the soil is very heavy or wet, it should be lightened with old mortar broken finely, or road sweepings.

---

[1] Intermittent sterilising is the equivalent of sterilising on three successive days for 45 minutes to 212° F.

What to Grow.—The three kinds are briefly described below:—

Single.—All the colours as above, separate or in mixture. They bloom in June and July, and vary from 1–4 ft. in height.

Double.—Blue, pink, white, etc. They bloom in June and July. Height, 1–4 ft.

Cup and Saucer.—Blue, pink, mauve, white, etc. They bloom in June and July, and average 1–4 ft. high.—J. F.

CAP PLANT (*Silphium perfoliatum*).—See *SILPHIUM.*

CAPACITY OF BARRELS, CYLINDERS, TANKS OR BOXES.—See under VOLUMES in *ARITHMETIC AND GARDENING.*

CAPE ASTER (*Charieis.* Nat. Ord. Compositæ).—The genus Charieis has apparently only one species. It is decidedly interesting, however, and suggests possibilities under skilful selection. Seed may be sown in April and the resulting plants thinned to 8 ins. apart each way. They are useful for massing and carpeting or for the rock garden.

Charieis heterophylla (Syns. *C. caerulea, C. Neesii,* and *C. pilosella,* also *Kaulfussia amelloides*).—This bears Daisy-like flowers on slender stalks throughout the summer. There are various colours available, such as white, blue, violet, and crimson. Height, 6 ins.

C. H. C.

CAPE BULBS.

The chief of these are Crinum, Galtonia, Gladiolus, Ixia, Lachenalia, Lapeyrousia, Sparaxis, Tritonia, and Watsonia. The majority of these are of easy culture, and notes on this will be found under the above names in their proper places in this work.

CAPE FIGWORT (*Phygelius capensis.* Nat. Ord. Scrophulariaceæ).—This, as many gardeners know, is a most attractive hardy perennial subject for the herbaceous or mixed border, bearing bright scarlet flowers from August to September, and growing 3–4 ft. high. It succeeds best in the hottest, sunniest, and driest portion of the border, and then will give a wealth of bloom. In cold, wet, and exposed districts some winter protection such as a mound of ashes or cocoanut fibre refuse will be advisable. Otherwise it may be treated in much the same way as any other hardy perennial. Propagation is quite a simple matter: seeds may be sown in the spring, cuttings inserted in a rough frame in the summer, or the plants may be divided in November or March, which latter month is the best period for planting.

CAPE GOOSEBERRY (*Physalis peruviana*).—See *PHYSALIS.*

CAPE LILY.—See *CRINUM.*

CAPE POND FLOWER.—See *APONOGETON* and *WATER GARDEN: PLANTS FOR THE.*

CAPE PRIMROSE.—See *STREPTOCARPUS.*

CAPE SHAMROCK (*Oxalis purpurata*). See *OXALIS.*

CAPE STOCK (*Heliophila.* Nat. Ord. Cruciferæ).—This family includes several half-hardy annuals which are easily raised from seeds sown in gentle heat in spring, or from an outdoor sowing made at the end of March or in April. They are low growing, and do not last long when they have reached the flowering stage. The best species are *Heliophila amplexicaulis* (white and purple); *H. crithmifolia* (violet); *H. pilosa* (Syn. *H. stricta*), blue; and *H. p. incisa* (Syn. *H. araboides*), blue. These bloom in late June, and average 6–9 ins. in height.

CAPER SPURGE (*Euphorbia Lathyrus*).—See *Euphorbia*.

CAPERS.—See *Euphorbia*.

CAPNORCHIS.—Now included in the genus *Dicentra*.

CAPOLLIN (*Prunus serotina salicifolia*).—See *Trees*.

CAPON'S-TAIL GRASS (*Valeriana pyrenaica*).—See *Valeriana*.

CAPSELLA (Nat. Ord. Cruciferæ). This is a genus of troublesome annual weeds of no value whatever in the garden, but which are responsible by their presence for the spreading of Clubroot in cabbages, which disease is fully dealt with in our article on *Diseases of Plants*. The best known species is *C. Bursa-pastoris*, or Shepherd's Purse, described under the latter name, with methods of control, in our article on *Weeds*.

CAPSICUM.—See *Salad Plants*.

CAPSID BUGS.—See under Cuckoo Spit in *Insect Pests*.

CARAGANA.—For the best species see *Shrubs*.

CARAWAY.—See *Carum* and *Medicinal Herbs*.

CARBIDE OF CALCIUM.—See Calcium Carbide in *Lime Compounds*.

CARBIDE REFUSE.—See *Soil Fumigating*, and under Calcium Carbide in *Lime Compounds*.

CARBOHYDRATES.—See under Carbon in *Chemistry for Gardeners*.

CARBOLIC ACID.—See *Acids*, *Soil Fumigating*, and *Weed Killers*.

CARBON.—A few notes on this essential element will be found in *Chemistry for Gardeners*.

CARBON ASSIMILATION.—See under Food Synthesis in *Plant Physiology*.

CARBON BI-SULPHIDE.—See *Soil Fumigating*.

CARBON DI-SULPHIDE.—The same as Carbon Bi-Sulphide.

CARBONATE OF AMMONIA.—The same as Ammonium Carbonate. See *Ammonia and Ammonium Compounds*.

CARBONATE OF CALCIUM. — See Calcium Carbonate in *Lime Compounds*.

CARBONATE OF LIME.—The same as Carbonate of Calcium.

CARBONATE OF MAGNESIA.—The same as Magnesium Carbonate, to which a reference is made in *Magnesia and Magnesium Compounds*.

CARBONATE OF POTASH. — See Potassium Carbonate in *Potash and Potassium Compounds*.

CARBONATE OF SODA.—See Sodium Carbonate in *Soda and Sodium Compounds*.

CARBONIC ACID.—See *Acids: Their Uses in Horticulture*.

CARDAMINE (Bitter Cress. Nat. Ord. Cruciferæ).—This genus now includes that previously known as *Dentaria*, and although a comparatively large one is quite unimportant since there are many better subjects. It chiefly consists of hardy annuals, hardy herbaceous perennials, and hardy rock plants. The first and the last sections are excluded from this work, as they are beyond its present scope.

The hardy perennial species are useful for the ordinary borders and for shrub borders. They will thrive in moist rich soil in a sunny site. They are not hard to propagate by division of the roots in the spring or autumn, at which times they may be successfully planted. We recommend the following:—

Cardamine bulbifera (Coral Root).

This bears purple flowers in May, and grows about 18 ins. high.

C. diphylla (TOOTH CRESS).—This bears purple or purple and white flowers in April and May. Its height is 1 ft.

C. enneaphylla.—This bears pretty yellow flowers from May to June, and grows 12 ins. high.

C. maxima.—This sort bears pale blue-purple flowers in May, and grows about 2 ft. high.

C. pinnata.—This is similar to the above, but only grows a little over 12 ins. high.

C. pratensis (LADY'S SMOCK).—This is a common marsh plant hardly worth growing in the borders, though the double form *flore pleno* is quite attractive. A very moist site is required for both these pale purple spring blooming subjects and also for the white form *alba.* All grow about 12 ins. high.

C. Waldsteinii (Syn. *Dentaria trifolia*).—This is a pretty white May flowering subject for the front of the borders, growing about 12 ins. high.

CARDARIA.—Now included in the genus *LEPIDIUM.*

CARDOON (*Cynara Carduncutus.* Nat. Ord. Compositæ).—Although these enjoy little popularity among English vegetable growers, they are largely grown and appreciated abroad; but owing to the amount of room and considerable after attention required, they are not recommended to owners of small gardens or others who wish to grow the most profitable crops. The plants can be raised and treated exactly as advised under *CELERY.* When fully grown and perfectly blanched, they are used in soups, or as a boiled vegetable.

See also *CYNARA.*

CARDUUS (THISTLE. Nat. Ord. Compositæ).—This was once a very large genus, but at the present time most of the species are included by botanists in other genera, notably in *CNICUS*, on which a separate article appears. The species still retained are apt to be weedy, and should not be grown in the choicest borders, though they are useful in the shrub borders or the wild garden.

What to Grow.—The following species may be mentioned:—

Carduus arvensis.—This, the weed known as CORN THISTLE, is now known as *Cnicus arvensis.* It is referred to in our notes on *CNICUS.*

C. crispus.—This is a purple-flowered biennial species blooming in July, and growing about half a yard in height.

C. nutans (MUSK THISTLE).—This biennial species is probably the most popular of all with its purplish flowers in July, on plants 2 ft. in height.

C. tenuiflorus (Syn. *C. pycnocephalus*).—This, the SLENDER-FLOWERED THISTLE, is a perennial bearing purple flowers from July onwards, and growing 3–4 ft. in height.

See also HOLY THISTLE in *MEDICINAL HERBS.*

CAREX (SEDGE. Nat. Ord. Cyperaceæ).—This is a large genus of hardy perennial and half-hardy or greenhouse grasses or sedges of very little importance in the garden. *C. pendula* is a good plant for the water garden. Other sorts chiefly suitable for the wild garden include *C. flava,* the MARSH HEDGEHOG GRASS; *C. glauca,* the CARNATION GRASS; *C. hirta,* the HAMMER SEDGE; *C. paniculata,* the HASSOCK GRASS; and *C. Pseudocyperus,* the BASTARD CYPERUS. All are of the easiest culture and spread quickly when once planted. This genus does not contain the SWEET SEDGE described in our article on *MEDICINAL HERBS.* That belongs to *ACORUS,* which see.

CARNATION.—(*Dianthus Caryophyllus*).—See *DIANTHUS*.

CARNATION GRASS (*Carex glauca*).—See *CAREX*.

CARNATION MAGGOT.—See *INSECT PESTS*.

CARNATION : The Malmaison.

Among the several types of Carnations, the Malmaison is the most handsome and noble flower. It has been largely grown for a number of years as a summer flowering plant, and it is of a comparatively recent date that perpetual flowering varieties have been introduced. These can be had in bloom far more easily during the winter than the older type of plant. It is of the latter, however, that this article deals with in the first place.

In common with the other kinds of Carnations the Malmaison requires a light house, with a cool buoyant atmosphere, if it is to be grown to perfection.

Care of Layers.—It is most easily propagated by layering in July and August, and the last week in July is an ideal time. Select plants that are free from any trace of disease for this purpose, and preferably those that have been placed outside in an open position for about ten days after flowering. Layer the plants in a frame, in the usual way described in our article on *PROPAGATION OF PLANTS*.

After layering, water well, and keep the frame close until roots commence to form; shade from the sun, and give the layers a spray over with the syringe twice daily. If the weather is very hot, it is admissible to allow an inch or two of air at the top of the frame, and when the roots form, increase this, until after a few days the lights can be removed entirely. Sever the layers in the usual way, lift with a small hand fork, and pot separately in 60-sized pots. Place them in a frame, and keep fairly close for a few days, but then give more air, and shade from bright sunshine. When the plants are nicely rooted shift them into 32-sized pots, and see that they are moist at the roots before this is done. A compost consisting of three parts good fibrous loam, and one part flaky leaf-soil, with the addition of a little old mortar rubble, and sufficient wood ashes or crushed charcoal and silver sand to render the soil free and porous, suits the plants well. The inclusion of a little old soot will be beneficial. Plenty of crocks are needed. Watering will require great care, as Malmaisons resent much moisture at the roots, especially during winter.

Winter Treatment.—The best place for the plants during the winter is a span-roof house, where sufficient heat can be turned on to exclude frost. A night temperature of 45° F. is sufficient, and in very cold weather 40° F. would be better. Admit all the air possible on favourable occasions, and when the weather is damp and foggy, just an inch or two of air with a little warmth in the pipes will be the best means of keeping the atmosphere dry and buoyant. Under such conditions the rust disease will not attack the plants. Greenfly is easily kept in check by an occasional fumigation.

After the turn of the year the plants will show signs of renewed growth, and occasional applications of soot water will prove beneficial. When the flower spikes commence to develop a light dressing of some Carnation manure may be given at intervals with good results, and is generally to be preferred to liquid farmyard manure, although the latter may be used occasionally if properly diluted.

Plants that were layered late in the season, and passed the winter

CARNATIONS

in small pots, should be potted on early in March. Give stakes when necessary, and disbud the growths carefully to obtain fine flowers.

When the blooms commence to show colour it is beneficial to shade them from strong sunshine, or they will not last fresh and bright for so long a period.

Treatment after Blooming.—After the flowers are over, select the best plants to grow on for another year. Those with the most healthy and vigorous growths are the ones to retain. Pot these into 9–10-inch pots; vigorous varieties of the Princess of Wales type make fine specimens in the latter-sized pots. The compost already recommended should be used, but a little Carnation manure can be added with advantage. Make sure that the plants are moist at the roots in the first place, and pot firmly. Tie out each growth to a separate cane, and grow the plants on in a light, airy position. The treatment of these plants during the autumn and winter is similar to that already described.

Varieties.—These are numerous, but when purchasing take care to get the plants from a nurseryman who has a thoroughly healthy stock.

Duchess of Westminster—a good sort for early flowering—is a lovely rose-salmon-pink. The blooms are not so large as some, but the perfume is glorious.

Lady Coventry is a handsome rich red, and is a vigorous grower.

Lord Rosebery is rather similar in growth and size of flowers to *Duchess of Westminster*, while the blooms are a telling shade of cardinal red.

Maggie Hodgson is a rich deep crimson.

Nautilus is a pale pink, and *Nell Gwynne* a good white variety.

Princess of Wales is one of the finest varieties, and it has a very pleasing perfume.

Perpetual Flowering Malmaisons.—These flowers have undoubtedly come to stay, and are increasing in popularity owing to their extended period of flowering. Their cultivation and general treatment is on the same lines as the Perpetual Flowering Carnations, and readers are referred to the article on the same. It is not advisable to stop the growths more than once, or the flowering period is too long delayed.

There are several good varieties, and of these *Mrs C. F. Raphael* is one of the best. The blooms are a lovely shade of cherry red, and are produced on tall erect stems. *Marmion* is a very pleasing variety; the blooms are a soft shade of pink, overlaid with cream markings. This variety has been grown for some years, and is very popular. *Majestic* and *Terrific* are newer varieties, both red shades, and there are likely to be hosts of other fine novelties in the near future.—J. G.

CARNATION: The Perpetual Border.—This is a new section, resembling the ordinary Borders, but flowering out of doors throughout the season up to September or October. The treatment is the same as for the ordinary Border varieties. Propagation may be effected by layers of non-flowering shoots, by cuttings, and also by seed.

Varieties.—The following are the best at present:—

Brilliant.—White flowers, edged and flaked with purplish crimson.

Highland Lassie.—White flowers, flaked with red.

Rosalind.—Yellow flowers, heavily marked with red.

Sussex Pink.—Delicate flesh-pink flowers.—W. J. C.

CARNATION: The Perpetual Flowering.—Few flowers are so much appreciated or so useful for decorative purposes as Perpetual Flowering Carnations. The plants can be had in bloom during the whole year with ordinary care, but it is chiefly during the winter months that they are most valued. They are among the most economical greenhouse plants, owing to the little heat that is necessary for them, consequently they are ideal flowers for the amateur gardener.

Essential Details. — There are several essential points to observe if the grower wishes to meet with a full measure of success. The foremost among these is the maintenance of a fresh, buoyant atmosphere, combined with the maximum amount of light during the dull months of the year. A span-roof house is the best for the plants, but it is a matter of small consequence whether the house runs north and south, or east and west, if it is in an absolutely open position.

Provision should be made for abundant ventilation in hot, sunny weather. A house fitted with a central stage, and staging around the sides, is the best, when it can be managed.

Propagation.—This is effected by means of cuttings. The best time to insert them is from November until February. If the plants are rooted too late in the season, they do not become well-grown specimens before winter. The best plan is to place a small propagating frame on the stage of a greenhouse with a temperature of about 50° F., with a few degrees more bottom heat if possible. Cover the bottom of the frame with 3 ins. of fine sand, and make this moderately firm. The cuttings should be selected from plants that are healthy and free from any kind of insect pest. Shoots about 4 ins. in length from the central parts of the stems make the best cuttings. They are then slipped off and inserted firmly in the usual way, as is described under CUTTINGS in the article on *PROPAGATION OF PLANTS*, after which a good watering is given. Little more water should be needed until the cuttings take root, but if there are signs of dryness, give more water. Remove the light from the frame every morning for about an hour, and dry the inside of the glass. Otherwise no air is needed until the cuttings are rooted, but then it should be gradually increased until the frame-light can be left off entirely.

Potting On.—After about three days of this last treatment, when the cuttings are nicely rooted, take them up carefully and pot them separately in 2-inch pots. For this use fine soil consisting of three parts loam, with the remainder made up of silver sand and good leaf-soil. Grow the plants on in the same temperature, and water them after potting, but later on only give water when the soil becomes dry. When the pots are full of roots transfer the plants to large 60's. A similar compost is advised here, but a little fine wood ash may be added with advantage. See our article on *POTTING* for general hints on this matter.

Continue to grow the plants on in a position near the light to encourage sturdy growth, and do not allow the temperature of the house to exceed 55° F. When growth has advanced a little, pinch out the tops of the plants to induce the formation of side-shoots; but do not do this too early, as some varieties produce side-growths naturally. The best time to do this stopping is during the early morning, and if the growths are bent sideways they will snap off readily. About five pairs of leaves should be left when this is done.

The most forward plants will be ready to move into 48-sized pots in March. Use a compost of three parts good fibrous loam and one part flaky leaf-soil, with the addition of some wood ashes, old mortar rubble, and a little silver sand. If the loam is rather heavy, add a little more opening material to the compost. Pot firmly. Grow the plants on under similar conditions, but give more air on fine days. In May, remove them to a cold frame, and when they are sufficiently rooted shift them into pots known as 24's, when a similar compost should be used. It will be beneficial, however, to add a little of some approved Carnation manure at the rate of a 5-inch potful to each bushel of the compost. Bone-meal and soot are good substitutes for a special manure. Water carefully after potting, and on bright days give the plants a light spray over with a syringe during the late afternoon, but in time for the foliage to become dry before night.

Stake and tie the plants as support is needed. The growths should be stopped a second time, and although the period for doing this varies with the variety and district, the middle of July is usually late enough. Varieties such as *Carola*, *Baroness de Brienen*, and the Perpetual Flowering Malmaisons are most satisfactory if only stopped once. Plants rooted after the New Year should be treated in the same way; but in this case it is preferable to pot them in 32's direct from the 60's, and allow them to flower in that sized pot.

Stand the plants in an open position from June until September, and give them weak soot water at the root every three days when nicely rooted. It is also beneficial to spray them lightly overhead with clear soot water in the afternoon after bright days. It is a good plan to have a wooden framework over the plants, so that frame-lights can be placed over the top in case of heavy rain-storms.

Housing the Plants.—The end of September or early in October is the best time to put the plants under glass. When this is done, examine them carefully for any sign of disease or insect pests, and remove any decayed foliage at the base. Fumigate the house, when full, with nicotine, and repeat this at intervals to guard against green-fly. Ventilate freely on all favourable occasions, and only use fire heat when necessary to expel excessive moisture in the atmosphere, and to prevent the temperature from falling too low when frosts threaten. Too much moisture encourages the rust disease. If any of the leaves are found to be attacked by this, the best plan is to cut them off and burn them. A night temperature of 50° F. suits the plants well in winter, but no harm will follow if it falls a few degrees lower on frosty nights. Avoid overheating the pipes at any time, and endeavour to keep a little air on the top of the house when it can be done without lowering the temperature too much.

After-Treatment.—Watering needs especial care, and on no account must the plants be kept too wet at the roots. Attend to this work during the morning, and avoid spilling water about the house in damp weather.

After the plants are settled in their flowering quarters, they will derive benefit from judicious feeding with a little Carnation manure, and this may be followed up at intervals, except for a few weeks at midwinter, and until growth becomes more active such feeding should be given sparingly.

Disbudding requires careful attention at all times if fine blooms are expected. Remove the side-shoots gradually, for if all the flower-buds are taken off a stem at the same time the bloom will probably be blind or malformed. Beyond keeping the shoots neatly tied for support as growth advances, there is little further attention needed by the plants.

Open - Air Culture. — Perpetual Flowering Carnations are very suitable to plant in the open garden, where they can be had in full bloom from May until October. Plants that have flowered in the greenhouse during the winter give good results treated in this way. The best specimens for the purpose are those that are well set with flower-buds at planting time, and if they are kept neatly tied and have the dead blooms removed as these appear, they will make a very attractive flower-bed throughout the summer. Cuttings inserted in a shady frame during August make nice-sized plants to put out towards the end of April. They can also be rooted successfully in the open garden, and will pass through the winter safely in most districts with just a little protection during severe weather. Owing to the length of time they continue to flower, they are to be preferred to Border Carnations for an outdoor display.

[Insect Pests and Diseases, with their remedies, will be found separately dealt with in our articles on those subjects.—Editor.]

Varieties. — These are very numerous, and new ones of merit are continually being introduced. Those mentioned include sorts whose merits entitle them to be generally grown :—

Baroness de Brienen is an unusually fine flower. The blooms are large, and of a pleasing salmon-pink shade.

Benora also merits inclusion, as its fine white flowers with pink markings are very telling and distinct in appearance.

Britannia still deserves inclusion if a good stock of it is obtained, and it is a fine variety for summer bedding.

Carola is a delightful crimson of exceptional size. This variety is well worth every care to grow it to perfection.

Enchantress, though an older sort, still deserves a place where pale pink blooms are appreciated, and it is in every way a grand variety when a good stock of it is obtained.

Lady Northcliffe is a lovely salmon-pink, and is very fine when at its best.

Mary Allwood is one of the finest of modern Carnations. The blooms are of good size, exceptionally well formed, and are produced on sturdy, erect stems. The colour is a pleasing shade of cardinal-pink.

Mikado, frequently described as a glistening heliotrope, is well worth growing, and is often in great demand.

Mrs C. W. Ward is a healthy and productive variety with cerise-pink flowers ; a good market Carnation.

Rose Enchantress is a cerise-pink form of *Enchantress.*

St Nicholas is a showy scarlet variety.

Salmon Enchantress is a welcome addition to any collection ; the blooms are a good salmon-pink, but not over freely produced.

Scarlet Glow is one of the best reds, and when well grown is very fine.

Snowstorm and *Wivelsfield White* are useful sorts, with flowers of a looser build.

Sunstar is an attractive flower, with its yellow blossoms just marked with pink.

Triumph is a free-flowering crimson variety of especial merit.

White Wonder is one of the best white sorts, the blooms being of perfect shape and good size.

J. G.

UP-TO-DATE SELECTIONS.

Alice.—Blush pink.
Allwood's Prolific.—Pink.
Betty Lou.—Pink.
Blanche.—White.
Boston Ward.—Pink.
Brilliant Improved, Page's Variety.—Scarlet.
Canadian Pink.—Pink.
Cattleya Mauve.—Rosy-mauve.
Circe.—Mauve.
Citron.—Yellow, cerise, and white.
Coral Glow.—Apricot.
Countess of Pembroke.—Red.
Dainty Maid.—White and red.
Eastern Maid.—Rose and heliotrope.
Edward Page.—Market kind. Cerise-pink.
Evelyn.—Pink, flaked white.
Evelyn Townley.—Cerise-rose.
Fury.—Scarlet.
G. F. Phillips.—Crimson.
Gladys.—Rose.
Good Cheer.—Pink.
Guy Allwood.—Salmon-pink.
Hebe.—Pink.
Improved Mary Allwood.—Pink.
Ivory.—White.
Kathleen.—Salmon and rose.
Laddie.—Pink.
Lady Brodia Henderson.—Salmon-orange.
Louvain.—Salmon-cerise.
Margot Holmes.—Mauve-pink.
Mary Allwood.—Pink.
Maud Allwood.—Orange-red.
Melchet Beauty.—Heliotrope, marked with red.
Mrs A. J. Cobb.—Crimson.
Mrs Douty.—Crimson.
Nora West.—Salmon-pink.
Pink Sensation.—Pink.
Rapture.—Rose-pink.
Sunny.—Apricot, flaked cerise.
The Lady Seaforth.—White.
Thomas Ives.—Cerise.
Vesta.—Cerise.

CARNATION RUST.—See *DISEASES OF PLANTS.*

CARNATIONS (*Dianthus Caryophyllus.* Nat. Ord. Caryophyllaceæ). **Cultivation in the Border.**—Damp is the greatest enemy of the Carnation; to avoid it great care must be taken in preparing the soil. The ground should be trenched, or bastard trenched, at least a fortnight before planting is to take place, and then arched up and trodden very firm. To light soil add well-rotted cow manure or farmyard manure. Stable manure is best for clay soils, to which sand or mortar rubble should also be added. The roots of the plants should on no account be allowed to come in contact with fresh manure. The late Mr James Douglas was a most strenuous opponent of over-manuring; he attributed weakness of constitution and liability to disease mainly to the unwholesomely rich soil used by most of the carnation growers of the nineteenth century.

Carnation layers should be planted out in autumn. They may also be potted up then, kept in a frame during the winter, and planted out in March. Autumn planting produces finer stock, as well as a larger number of blossoms, and is to be recommended except when soil is apt to become water-logged. Plant at least 15 ins. apart, and make the soil very firm round the roots and stem, avoiding any depression which would hold water at the collar. All dead and diseased leaves should be removed and burnt; otherwise there is little to be done during winter for plants in the border.

In April and May, when the plants begin to send up flower-stems, these must be tied to stakes (thin bamboos about 4 ft. long are the best) with pliable raffia or bast. Cross the tie between the stake and stem so as to form the figure 8. If the ground be very dry, watering may be necessary in May, but it should be postponed as long as possible. Mulching or hoeing conserve the moisture deep in the soil; but when the time comes that watering can no longer be postponed, then give a thorough soaking one day, or perhaps two days running, hoe the next day, but do not water again for three or four days at least.

Flower-stems must be disbudded rigorously if it is intended to exhibit. Even for ordinary purposes varieties which produce half a dozen buds close together at the top of the stem require to be disbudded. But an increasing number of modern varieties produce blooms at even distances down the stem, and these require little or no disbudding except for exhibition.

Pot Culture.—Carnations for exhibition should if possible be flowered in pots in an unheated greenhouse. This procedure renders it easier to protect them from insect pests, and makes it possible to retard or accelerate the time of flowering, as may be required by the date of the show. Also plants grown in pots tend to produce weaker foliage and finer blossoms than those growing in the border.

Layers should be potted up in autumn, one plant being placed in a 3-inch pot, two plants in a 3½-inch pot. Ordinary potting soil suffices, provided it is porous; an ideal mixture may be composed of 4 parts loam, 1 part leaf-mould, 1 part manure, ½ part ground oyster shells or coarse sand. Both leaf-mould and manure must be thoroughly decayed. The pots should then be placed in a cold greenhouse, or frame, to which, after the first week, as much air as possible should be admitted; whilst watering should be most sparing, and care taken not to wet the leaves.

In March the plants should be transferred to the flowering-pots; two plants in an 8-inch pot is best. They should then be stood out of doors on dry ashes. As the plants make larger roots more and more water must be given. In hot weather much care must be exercised to prevent the roots becoming dry; on the other hand, in cool weather the soil should not be too wet. Very firm potting is absolutely necessary.

Care must be taken to prevent ants or other insects entering the pots. Staking must be attended to as directed under heading CULTIVATION IN THE BORDER. For exhibition, disbud to one bloom before the buds show colour. In any case plants in pots require disbudding, as they cannot satisfactorily produce as many blooms as large plants deeply rooted in the open ground. I advise against applying chemical manures, but from the middle of June weak cow or sheep liquid manure may be given in small quantities twice a week, *after* watering.

As soon as flower-buds begin to show colour the pots should be moved from the open air into an unheated greenhouse, and elastic bands should be placed round the buds to guard against the possibility of split calyces.

Propagation.—New varieties of Border Carnations are raised from seed, but existing varieties are increased by layering, which should be proceeded with as early in the summer as possible. June is not too early. Layering is dealt with under *PROPAGATION OF PLANTS*. Equal quantities of loam and leaf-mould, and a little thoroughly decayed manure, with ground oyster shells or coarse sand, make a suitable compost. For pegging down various makes of layering pins are sold, or ladies' hairpins can be used.

If possible, layer in showery weather in the case of plants growing out of doors. In dry weather layers require watering twice a day through a fine rose for the first few weeks, and after that once a day. In the case of shoots growing high up the stem the compost has to be much raised, and naturally becomes dry sooner than when on the ground level.

At least two months (longer if possible) should elapse between layering and transplanting. Then the shoot layered should be severed from the parent plant with a sharp knife, and a day or two later should be transplanted to the ground, prepared as advised under heading CULTIVATION IN THE BORDER; or potted up and placed in a cold greenhouse, or frame.

Plants growing in pots are usually layered in the pots; some growers prefer to turn them out of the pots into the border when the flowering season is over, and layer them there. This practice has the disadvantage of deferring layering until August.

SEEDLINGS.—Sow in seed pans in the spring, place in moderate heat, or under a frame or hand-light. After germination remove to a cold house; prick out as soon as the seed leaves are fully developed. Plant in open ground in July and subsequent months, 18 ins. apart.

Varieties.—Border Carnations are being rapidly improved at the present time; each year sees the introduction of novelties which are superior to older varieties. Consequently any list of named varieties becomes speedily out of date. The following list is arranged in classes as defined by the National Carnation and Picotee Society, and the order is that of merit according to my judgment:—

SELFS.—"These should be of one decided colour. If the flower be in any way shaded, striped, or spotted, it is at once disqualified for Self Class."

Dark Red and Maroon Selfs.—Gordon Douglas, E. K. Wakeford, Mrs George Marshall, Bookham Clove, Henry Brett of New Zealand, The King, Hercules, Surrey Clove, Induna.

White Selfs.—Bookham White, Elaine, Purity, Prairie Belle, Farthest North, Sir Galahad, Trojan, Kate Nickleby.

Yellow Selfs.—Daffodil, Glamour, Sunbeam, Solfaterre, Cecilia.

Buff and Terra-cotta Selfs.—Elizabeth Shiffner, Dora Blick, Mrs Griffith Jones, Mrs G. A. Reynolds, Robert Bruce, Mrs Robert Morton.

Red and Scarlet Selfs.—Fujiyama, Fiery Cross, Miss Willmott, Cardinal, General French, Firefly Deloraine, Glowworm, Brigadier, Veldtfire.

Pink and Rose Selfs.—Mrs Percy Smith, Rosetta, Salmonea, Annie Laurie, Rosy Morn, My Clove, Wyatt, Peach Blossom.

Wine-coloured Selfs.—Miss Rose Josephs, Ziska, Opalesce.

Grey or Lavender Selfs.—The Grey Douglas, Ellen Douglas, Evangeline, Greyhound.

Purple Selfs.—Purple Emperor, Cassius, Irma, Dick Swiveller, Royal Velvet.

FANCIES.—"These are best defined as varieties that cannot be admitted into any other classes. They should be large, and their chief excellence lies in their quality of petal and brilliancy of colouring. The ground colour may be yellow, apricot, or white, striped, flaked, or spotted with various colours."

Yellow Ground Fancies.—Pasquin,

Lord Steyne, Lieut. Shackleton, Skirmisher, J. J. Keen, Virginia, The Dawn, Centurion, Sweet Anne Page, John Ridd, Sam Weller, Linkman, Queen Eleanor, Becky Sharp.

White Ground Fancies.—Othello, Mrs G. D. Murray, Daisy Walker, Fair Ellen, Mrs P. W. Owen, Lord Kitchener, Betty, Montrose, George Robey.

Nondescript Fancies.—Mrs Andrew Brotherstone, Caprice, Hecla, Banshee.

BIZARRES AND FLAKES.—" These are White Ground Carnations. The Bizarre must have on every petal stripes of two different colours. In the Flake these stripes must be of one and the same colour. In both classes the stripes should be clear and well defined: broad on the edge of the petal and gradually diminishing until they sink into the heart of the flower."

Bizarres.—Armourer, Supreme, Remus, Carbine, Black Diamond, Arthur, Amersham, Zebra, Sonata, William Skirving.

Flakes.—Gordon Lewis, Kobe, John Peel, Torchlight, Recorder, Rose Noble, Dick Swiveller.

YELLOW GROUND PICOTEES.—" These should have a clear yellow ground (not apricot or buff). The petals should be firm, flat, and smooth, and their edge well rounded and free from fimbriation. The line of colour on the edges of the petals may be light, medium, or heavy, but should be of one continuous colour and entirely confined to the edge; any break in the margin or a running down of the marginal colour into the petal being esteemed a grave fault."

Yellow Ground Picotees.—Margaret Lennox, Onward, Mrs J. J. Keen, Togo, Eclipse, Professor Burstall, Niel Kenyon, Her Majesty, Santa Claus.

WHITE GROUND PICOTEES.—" Saving in the colour of the ground, the qualities required in this class are identical with those laid down for the Yellow Ground Picotee."

White Ground Picotees.—Perfection, Fair Maiden, Clytie, John Smith, Lavinia, Amy Robsart.

S. M. K.

UP-TO-DATE SELECTIONS.

Beauty of Cambridge.—Pale yellow. A good kind for cutting.

E. Lyall Swete.—Scarlet.

Flambeau.—Reddish-orange. A good kind for cutting.

Inez.—White.

Sidney Crowhurst. — Purple. Scented. Splendid sort for cutting.

CARNIVOROUS SLUGS.—See *INSECT PESTS.*

CAROLINA ALLSPICE (*Calycanthus floridus*).—See *SHRUBS.*

CARPENTARIA.—For the best species see *CLIMBING AND TRAILING PLANTS* and *SHRUBS.*

CARPENTER'S LEAF.—A name sometimes applied to *Galax aphylla.*

CARPET BEDDING.

At the present day carpet bedding is not much practised, though in the seventies and eighties of last century it was carried to a great extent and perfection, especially in the public parks of the British Isles; but it was also well done in private establishments on a smaller scale. The work was carried out with flowering plants, though they were not allowed to bloom as a rule, the flowers being pinched out to prevent it and to keep the plants to a dwarf and uniform height, according to their situation in the beds. Plants of various heights were employed, but the system of pinching reduced them to a common or desired level. The effects were obtained by making panelled beds, often of intricate design, and planting the various panels, with subjects having red, purple, crimson, rose, yellow, golden, white, grey, or variegated leaves. The general effect was splendid or gorgeous to a degree, proportionate to the boldness of the design, the wealth of plants employed, and the neatness of the whole. This was effected by using hundreds of thousands of small plants to cover the ground soon after they were established. Owing to the large numbers employed, and the work of pinching every two or three weeks, the expense was great and the art gradually got abandoned as the novelty of this style of gardening wore off. In many gardens a large number of hardy plants were employed; but as many tender ones formed a large proportion of the best designs, stock had to be kept in hot-houses during winter, and these had to be propagated extensively in February, March, and April in properly heated houses or propagating pits.

Single beds of oblong, oval, circular, square, and other outlines were cut out in grass alongside the principal walks in parks and gardens, in full exposure to sunshine to keep the plants dwarf, sturdy, and highly coloured. Geometrical beds in greater or less number were also laid out in symmetrical designs in the more ambitious flights of the art. Each bed was laid out in a series of panels, numbering four, six, eight, or some other number that would enable two panels at least to be planted with the same variety of plant. If there were only three leading panels in a bed, all had to be planted alike, but with four, two could be filled with one plant, and two with another, and so on for the whole design. Every two panels thus planted had to be opposite one another, not side by side. Most beds were level, but others, especially circular ones, had an elevated table in the centre, and a smaller and still higher one within it, both being level on the top to prevent rain or water from running off. The sloping sides of these tables were often puddled and planted with appropriate subjects to hold them up.

The beds were first dug, levelled, or variously built up, and then raked quite smooth, after which the design could be drawn upon them for the guidance of the planters. The outlines could then be planted with suitable subjects to make dividing lines, and the panels were then filled in with their appropriate subjects. Every circular bed had a central or dot plant, and every panel might have a centre of its own, the plants used being generally different from those in the centre of the bed. Large panels near the outside of the bed were often planted with something green, such as *Herniaria glabra*, *Mentha Pulegium gibraltarica*, Mossy Saxifrages, *Sedum lydium*, and *Veronica repens*, all hardy; but this groundwork, as it was called, might be filled with tender plants, such as the Alternantheras, Lobelias, *Mesembryanthemum cordifolium variegatum*, *Sedum sarmentosum variegatum*, *Tagetes signata pumila*, and others. Yellow panels could be planted with *Alternanthera paronychioides aurea*, *Sagina glabra pilifera aurea*, *Stellaria graminea aurea*; purple ones with *Alternanthera amabilis*, *A. amoena*, *A. tricolor*, *A. versicolor*, *Iresine Lindeni*, or *Oxalis corniculata atropurpurea*; and grey or white ones with *Antennaria dioica tomentosa*, *Calocephalus Brownii*, *Cerastium tomentosum*, and encrusted Saxifrages. Dividing lines between panels were planted with *Coleus Verschaffeltii*, *Iresine Herbstii*, *I. H. aureo-reticulata*, *I. Lindeni*, *Kleinia Haworthii*, *K. repens*, and *Perilla nankinensis*. Edging plants were *Echeveria secunda glauca*, Golden

Feather, blue, white, or purple Lobelias, and Mossy Saxifrages. The Lobelias were allowed to bloom. The best plants for steeply sloping edges were *Echeveria secunda glauca, Sempervivum calcareum,* and *S. tabulaeforme.*

The centre of circular beds mostly or always had a tall or large plant, either light and graceful, or a massive succulent. Oblong or oval beds usually had a series of large centre plants along the middle, at regular intervals, according to the panels. Various other panels also had centre plants, but they were smaller and subservient to the centre of the bed. Large panels usually had dot plants at regular intervals. The size to which plants may grow in the course of years has no bearing on the situation, and never has had any. The present-day planter, like those in the past, has merely to avoid plants that will grow too tall in the course of a single season for any given bed.

PLANTS FOR CARPET BEDDING.

Alternanthera amabilis, A. amoena, A. paronychioides, A. p. aurea, A. p. magnifica, A. p. major, A. tricolor, and *A. versicolor.*
Antennaria dioica tomentosa.
Calocephalus Brownii (Syn. *Leucophyta Brownii*).
Cerastium tomentosum.
Chrysanthemum Parthenium aureum, and *C. P. selaginoides.*
Coleus Verschaffeltii.
Echeveria secunda glauca.
Herniaria glabra.
Iresine Herbstii, I. H. aureo-reticulata, and *I. Lindeni.*
Kleinia Haworthii (Syn. *K. tomentosa*), *K. repens.*
Kochia scoparia trichophylla.
Lobelia Erinus, in blue, white, and purple varieties.
Mentha Pulegium gibraltarica.
Mesembryanthemum cordifolium variegatum.
Oxalis corniculata atropurpurea (Syn. *O. c. rubra*).
Perilla nankinensis.
Sagina glabra pilifera and *S. g. pilifera aurea.*
Saxifraga Aizoon, S. caespitosa, S. Cotyledon, S. decipiens, S. Hostii, S. hypnoides, or any of their varieties.
Sedum hispanicum (Syn. *S. glaucum*), *S. lydium, S. sarmentosum variegatum.*
Sempervivum arachnoideum, S. calcareum, S. globiferum, S. Laggeri, S. montanum, S. tabulaeforme, S. Tectorum, S. tortuosum variegatum.
Stellaria graminea aurea.
Tagetes signata pumila.
Veronica repens.

CENTRE AND DOT PLANTS.

Aloe mitriformis, A. Serra.
Aralia Veitchii, A. V. gracillima.
Centaurea gymnocarpa, C. ragusina.
Cereus, any plants of suitable size.
Chlorophytum elatum variegatum.
Cordyline australis, C. a. Doucettii, and other varieties.
Cotyledon bracteosa, C. rosea.
Dracaena concinna, D. rubra.
Echeveria gibbiflora metallica, E. glauco-metallica.
Gasteria verrucosa, etc.
Kochia scoparia trichophylla.
Mamillaria, any plants of suitable size.
Ophiopogon Jaburan variegatus.
Opuntia in plants of suitable size.
Pandanus Veitchii.
Sempervivum arboreum, S. canariense, S. cuneatum, S. Haworthii.
Yucca aloifolia, Y. a. tricolor, Y. a. variegata, Y. filamentosa, Y. f. variegata.—J. F.

See also *BEDS: SHAPE AND CHARACTER OF.*

CARPET JUNIPER (*Juniperus Sabina prostrata*).—See *TREES.*

CARPETING, ROCK PLANTS FOR.—See ROCK PLANTS FOR CARPETING in *ROCK PLANTS FOR ALL PURPOSES.*

CARPINUS.—For the best species see *TREES.*

CARPOCAPSA.—See CODLIN MOTH in *INSECT PESTS.*

CARPOCERAS.—Now included in the genus *THLASPI.*

CARRION-FLOWER (*Smilax glauca*). See *SMILAX.*

CARROT (*Daucus Carota.* Nat. Ord. Umbelliferæ).—This, in addition to being one of the most useful, is also one of the easiest vegetables to grow, requiring nothing more than a deeply dug and fairly rich soil to secure roots perfect in size, form, and colour.

Culture.—For very early crops sow in heated frames or mild hotbeds made up of leaves and fresh stable manure early in February. Thin sowing should be observed, and ventilation given on all suitable occasions. The very short sorts, termed Shorthorn, are suitable for the most shallow soils; for soils of a fairly deep nature the stump-rooted varieties growing about 4–8 ins. long are the most suitable, but where a good deep and rich loamy soil exists, specimens 2 ft. long may be had without any special preparation of the bed.

The first outdoor sowing may be made in a warm border any time after January, always selecting one of the small growing varieties. Cover the seed lightly with very fine soil to which a little wood ashes has been added, laying a few bushy sticks over the bed to keep it warm and induce a more rapid germination. After the seedlings are well through the soil remove the sticks, but should very cold winds or sharp frosts follow give a light scattering of hay or straw.

Where the soil is in a highly fertile state and of good depth, the Intermediate or Giant type should always have preference. In preparing the ground for these, fresh animal manure must be avoided, but where the soil is of an exceptionally hungry nature, and no manure applied for the previous crop, a good dressing of old hotbed manure, leaf-soil, or well-decayed vegetable matter will be an advantage. A light sprinkling of old soot, bonemeal, or one of the better known advertised manures, just previous to raking the surface level preparatory to sowing, is also allowable where the soil is poor.

Never attempt seed sowing when the soil is in a pasty condition; where this is so, draw the drills early in the morning of what promises to be a fine day, and sow the seed after the drills have been exposed to sun and air sufficiently long to make the soil friable and easily raked down. Cover the seed with half an inch of soil, and when the seedlings are well through the ground, thin out to at least 1 inch apart, further thinnings being made before the plants get crowded. For all ordinary purposes good carrots will follow if at the time of final thinning out the plants stand 8–9 ins. apart each way, more being allowed if extra large roots are expected. Keep the bed free from weeds, and during showery weather give repeated light applications of very old soot; this will serve a twofold purpose, keeping the foliage free from greenfly, and at the same time stimulating the growth. Lift the crop in November and store between layers of dry soil, or in pits in the open air.

For all varieties in the Shorthorn section 4 ins. between the drills will be ample. The stump-rooted require almost double this distance; while others of the Intermediate type need about 10–14 ins. between the rows.

Varieties:—*For Frames.*—Champion Horn, French Forcing, Little Gem.

For Early Borders.—Early Gem, Early Nantes, Guerande, Summer Favourite.

For Deep Soils.—Altrincham, New Red Intermediate, Prizewinner, Red Elephant, Red Surrey, St Valery.

For Shallow Soils. — Defiance, Matchless, and Sutton's Favourite. —F. R. C.

See also *ORNAMENTAL VEGETABLES*, and for METHOD OF BOTTLING see *VEGETABLE BOTTLING*

CARROT (*Daucus Carota*).—See *DAUCUS*.

CARROT FLY.—See *INSECT PESTS*.

CARTHAMUS (Distaff Thistle. Nat. Ord. Compositæ).—This is an unimportant genus of hardy annuals all of which are of exceedingly easy culture. The species most often grown is *C. tinctorius*, the well-known Safflower.

CARUM (Caraway. Nat. Ord. Umbelliferæ).—This is an unimportant genus of hardy biennials or perennials of very easy culture. *C. Bulbocastanum* is the well-known Pig Nut; *C. Carvi* is the common Caraway described in our article on *Medicinal Herbs*; while *C. Petroselinum* is the well-known herb used for garnishing and flavouring, namely, Parsley, the culture of which is described in its own article.

See also under Caraway in *Medicinal Herbs*.

CARYA.—For the best species see *Trees*.

CARYOPTERIS (Nat. Ord. Verbenaceæ).—This herbaceous perennial of doubtful hardiness is not largely grown. It will succeed in ordinary loam, though plenty of light humus is desirable. Planting may be done in the autumn or spring, though the last is the best time. Some winter protection is desirable. Propagation may be effected by cuttings of young growth, by division of the roots in autumn or spring, and also by seeds.

What to Grow.—Only three sorts are worth growing, namely, the following:—

Caryopteris mastacanthus.—This blue-flowered sort is useful for producing flowers in September. Height varies from 2 ft. to 5 ft.

C. mongolica.—This, a nondescript purple, violet, or doubtful blue, autumn blooming sort, averages about 3 ft. in height.

C. Wallichiana.—A red autumn blooming sort, averaging about 4 ft. in height.

CASCARA SAGRADA (*Rhamnus purshiana*).—See *Medicinal Herbs*.

CASHMERE SAGE (*Salvia hians*).—See *Salvia*.

CASSANDRA.—For the best species see *Shrubs*.

CASSENA (*Ilex Cassine*).—See *Holly*.

CASSINIA.—For the best species see *Shrubs*.

CASTALIA.—Now included in the genus Nymphaea.

CASTANEA.—For the best species see *Trees*.

CASTANOPSIS.—For the best species see *Trees*.

CASTOR OIL PLANT.—See *Ricinus*.

CAT MANURE.

This, as is well known, is a smelly solid rich in phosphates, as also is *Dog Manure*, upon which a separate note appears. Very little of it is available unless the garden is attached to a cats' home, so that it is hardly worth troubling about. If supplies are available, these may be mixed with farmyard or horse manure and dug in in the usual way in the winter.—E.

CAT TEASERS.—See *Cats in the Garden*.

CAT THYME (*Teucrium Marum*).—See *Teucrium*.

CAT WHIN (*Ulex europaeus nanus*). See *Shrubs*.

CAT'S-EAR.—See *Antennaria*.

CAT'S EAR.—See *Hypochoeris*.

CAT'S-TAIL GRASS.—See *Phleum*.

CAT'S VALERIAN (*Valeriana officinalis*).—See *Valeriana*.

CATALPA.—For best species see *Trees*.

CATANANCHE (Nat. Ord. Compositæ).—Two species of this are well worth growing. *C. caerulea*, the Blue Cupidone, is a blue-flowered hardy biennial blooming from July to August, and growing about 3 ft. high. A garden form *bicolor* (blue and white) is sometimes offered.

C. lutea is a yellow-flowered hardy annual blooming about the same time, and growing 9–12 ins. high. No special culture is needed by either; they may be propagated by division of the roots and by seeds in the usual way.

CATCH CROPS.

"What are catch crops?" uninitiated gardeners will ask. Very briefly, they are crops which are stolen from the land in a short space of time, either during the growth of another crop, or in the few remaining weeks of the season after that crop has been taken off the ground. All first-class gardeners use catch crops greatly, and thus get much more food from their land than they otherwise would do. Amateurs, however, and allotment holders have not yet realised the great value of catch crops, hence our reason for including this article.

Take, for instance, crops of peas sown in the garden. The best authorities advise a wide area being left between each row, some say not less than 4 ft., and others not less than 6 ft. Now it follows that if this course be adopted a great deal of land has to be allocated for the successful culture of the one crop of peas, and the return of food from the land is hardly great enough to do more than just about cover the cost of production. Market gardeners, of course, could not afford anything so extravagant as this. They have to make things pay, and every gardener ought to try to make things pay more than he does.

Reverting again to our rows of peas, if we leave 6 ft. of ground between each row, rather than waste this ground there are plenty of catch crops which may be sown and which will give a yield of food long before the peas are big enough to interfere with them. The two typical catch crops are early six weeks' turnips and spinach, and one gardener confessed to the writer the other day, that he made more money from his crops of spinach between his rows of peas than he did from the peas themselves.

Then take the case of root crops, such as parsnips, beetroot, salsafy, maincrop carrots, and so on, all of which occupy the ground for a very long period. If we consult the authorities they would say that these crops should have at least 15 ins. between each row. Quite so. But when we have only a limited area to grow vegetables upon such a distance as this between the rows means that we get very little return. If, however, we sow catch crops between each row, down go our costs, and up goes our production. It is possible to get two or three catch crops from one area by repeated sowing or planting during one long, single season alone.

One more example of the immense value of catch crops must be taken before we proceed to give a list. A plot-holder residing some eight miles from the present writer's house decided he would take up this problem of growing four times as much food as he had done previously, and this was how he managed it. Celery and leeks both took up large areas of his garden, areas which he said until lately had been difficult to afford on account of the great cost of production. Then it occurred to him to sow radishes between his rows of leeks and celery, and to sow lettuce mixed with the radish seed, and between every celery or leek plant he set a plant of endive. He had thus four crops on his celery patch and four on his leek patch where only one had grown before. Naturally the first crops to mature were the radishes which were ready very soon after sowing. Then came the lettuce, and after that the endive, which, of course, had to be tied up. None of these crops interfered with the celery or leeks in the slightest degree, since the trench system was not adopted, and a second crop of both lettuces and radishes was got from the same piece.

The Chief Crops.—The chief catch crops which are useful to the gardener are early carrots, corn salad, endive, globe beet, lettuce, radish, spinach, and six weeks' turnips. The culture of these is fully dealt with under their respective headings, but the following hints may be useful:—

Sow the first catch crops when you sow the main crops, for the earlier seed is in the ground the better.

Pay as much attention to your catch crops as you do to your main crops, and clear them off the ground as early as possible.

As soon as one catch crop is finished, sow or plant another, and have beds of transplantable stuff coming on in the reserve garden for the purpose.

Keep your catch crops thoroughly well soaked with water, and give them frequent doses of weak liquid manure.

And lastly, keep all catch crops as free from weeds and as thoroughly well hoed as it is possible to do in the restricted area in which they are grown.—E.

See also *KINDS OF CROPS.*

CATCHFLY.—A name applied to the genus *SILENE*, which see. See also *LYCHNIS.*

CATERPILLARS.

A number of different kinds of caterpillars are treated by another contributor under *INSECT PESTS.* But a few words may be said about one of the worst caterpillars, namely, the Cabbage Caterpillar, or the White Cabbage Butterfly. This caterpillar has an enormous appetite, and it greedily eats up any plants of the Cabbage family which it may come into contact with, as well as other plants. There was a regular plague of these caterpillars in some districts in 1917, hence the present writer offered a few small prizes to children who sent him the largest number collected between August 20th and October 31st. The winner of the first prize sent 3000, and several other competitors sent 2000 caterpillars or more.

Undoubtedly hand-picking is the best way of dealing with these caterpillars, but steps should be taken to kill all cabbage butterflies as early in the season as possible, to prevent the number being great. There is said to be a way of introducing a disease, but this is in an experimental stage as yet, and we shall probably hear more about it later.

A mixture of soft soap, salt, and warm water has been recommended as a spray for the cabbages infested with these caterpillars, but it is not so good as hand-picking.—E.

CATHCARTIA (Nat. Ord. Papaveraceæ).—An interesting plant with hairy leaves. It is a biennial and must be raised every other year from seed sown in gentle heat in March. It thrives in the shady part of the rock garden. Only one species need be troubled with:—

C. villosa.—Leaves in rosettes. Flowers yellow (Poppy-like), on leafy stems. Soil rich peat and loam. Flowering Period, June to July. Height, 1 ft.

CATHISSA.—Now included in the genus ORNITHOGALUM.

CATMINT (*Nepeta.* Nat. Ord. Labiatæ).—No gardening dictionary would be complete without a brief reference to this plant which brings back by its appearance and its aromatic scent thoughts of happy childhood days, spent rambling among flowers in old world gardens. Catmint culture is on the decline, and more is the pity, for the silvery-grey foliage of the plants makes a thick and beautiful carpet along the front of the perennial borders, and knolls in the rock garden covered with Catmint are remarkably pleasing. The least desirable species of all, *N. Glechoma*, is with other species used in herbal medicine.

Culture of Catmint is a remarkably easy matter. Plants should preferably be purchased in the autumn and then set in good rich ground to flower, and grow with great freedom the following season. Propagation is an easy matter; the best means of effecting this is by division of the roots in March, but cuttings of young growth slipped off after the plants have flowered will also give satisfactory plants. We recommend the following, all of which are hardy perennials:—

Nepeta Cataria.—This is so similar to *N. Mussini* that it is often mistaken for it.

N. Glechoma.—This, the GROUND IVY, and its variety *variegata*, the VARIEGATED GROUND IVY, are both undesirable and weedy plants which should not be grown save for medicinal purposes, and even then strictly limited.

N. longiflora.—This nurserymen's sort, given specific rank at Kew, is practically indistinguishable from *N. Mussini*, and may be considered synonymous with it.

N. macrantha.—This bears pretty blue flowers in July and August, on plants 12–18 ins. high.

N. Mussini.—This is the species we are fondest of, with its scented silvery-grey carpeting foliage and violet or blue-violet flowers. It blooms all the summer, and averages 9–12 ins. high.

N. Nepetella.—This is the pretty plant popularly known as SMALL CATMINT, bearing red flowers from June onwards, and growing 9–12 ins. high.

See also *POTHERBS*.

CATS IN THE GARDEN.

Gardeners have the idea that Cats are very undesirable visitors of the garden; thus in some works by us we find articles on "How to get rid of Cats," and illustrations of various "Cat Teasers."

But we are not willing to admit that cats are so undesirable as they are made out to be. Some cats are very destructive, but so are some dogs, and dogs are frequently more destructive than cats. Stray cats and dogs alike are unwelcome, on account of their undesirable habit of "foraging," but the domesticated pussy is quite capable of walking up and down the grass path between the herbaceous borders admiring the flowers.

Have you never seen a pussy, reader, enjoying an evening stroll in the flower garden? It is an amusing sight. Quite slowly she walks down the path, her head in air, stopping with the manner of a connoisseur from time to time, to admire the various flowers. She is fond of gay flowers and pleasant smells quite as much as you are, reader, and she regularly enjoys herself walking about studying flowers so demurely. But why should this harmless creature be regarded as an enemy of the gardener? She does no harm. She merely views the gardener's handiwork, and perhaps laughs at him a little sometimes, saying to herself: "If this were my garden I could make it much nicer. I should have some big beds of Catmint to roll in, and some large cushions of Rockfoil to sit upon."

Perhaps the gardener does not like his work being criticised by cats. But why should he object, I wonder? If he were to build a bridge instead of making a garden, it would be open for anyone from the veriest tramp to the greatest nobleman to criticise it. After all, cats are not great critics, so he must not much mind; they put their backs up when they are annoyed at the gardener putting two clashing colours together, and they purr when they reach a large group of plants which specially pleases them; but that is about as far as they go.

We are glad that Miss Jekyll (one of our valued contributors) bears out our appreciation of the domesticated pussy in one of her books. We consider that a pussy who is appreciative of flowers should be made a friend of by the gardener, and then she will probably repay him in her "working hours"—for of course even domesticated cats work very hard—by guarding his beds of small seeds from troublesome sparrows.

The above remarks apply to the domesticated pussy. The busybody tom-cat, who is as uneducated as he is active, is no real friend of the gardener. He tears across the garden in false pursuit of rats and mice, scratches up borders trying to find their nests,—though they seldom if ever make nests in so public a place,—jumps up trees, and springs on to choice shrubs in attempting to catch birds, and, in a word, does untold damage in a very short time. Such cats should be kept out of the garden as completely as possible; they are very useful for the stable-yard, but they must be regarded as being unfit to meet or converse with the ladylike domesticated pussy.—E.

CATTLEYA.—See *ORCHIDS.*

CATTLEYA FLY.—See *INSECT PESTS.*

CAULIFLOWER (*Brassica oleracea botrytis cauliflora.* Nat. Ord. Cruciferæ).—These are among the most highly prized of all summer and autumn vegetables, and for this reason they well repay the extra attention necessary if milk-white compact heads of good size and shape are to follow.

Many valuable additions have lately been made to the list of sterling varieties, and for this reason it is advisable that selection be not limited to one sort or one sowing. By means of successive sowings, cauliflowers may be had during the whole of the period when the more hardy Broccoli are not available. The first fully developed head should be ready before the end of May, the last, only after severe frost has killed the plants, at quite the end of the year.

For Early Work.—To supply good heads by 20th May, a sowing should be made in a heated greenhouse or on a mild hotbed early in February. Sow the seed in well-drained pans filled with rich soil, to which sufficient coarse sand has been added to ensure porosity. This is of utmost importance, and where not observed, disastrous results may follow a short time after the seedlings appear above the soil. Sow the seed very thinly to allow for sturdy growth, until each seedling is sufficiently strong to bear transferring to other pans or small pots with the least possible check to growth. Harden off by placing into cooler quarters, and plant out in the sunny borders, or under hand-lights early in April.

Sowing Out of Doors.—It is rarely safe to do this until the first week in April, and then a sheltered corner exposed to full sunshine should be selected. The seed-bed should be similar to that described in the article on *Broccoli* (which see). The first fortnight in May will be quite soon enough to make the main sowing; plants from seed sown at this date usually giving perfect heads until Christmas, or later, if a reliable strain of seed is purchased.

Throughout all stages of growth a rich soil should be provided, and until the plants are well established in permanent quarters, they should never be allowed to become dry. On the other hand, a constantly saturated soil should be studiously avoided.

Planting Out.—As early in the spring as possible, the permanent bed should be liberally manured, burying the manure at least 12 ins., thus enabling the plant to get the full benefit from the moisture this contains, just when bright sun, and possible drought, renders moisture of paramount importance to the hungry young roots. The distance between the early varieties need not exceed 20 ins. each way. Those planted later should be allowed a trifle more room, many of these developing heads equal in size to what are termed the Giant class. The last batch will repay a distance of 3 ft. between the rows and 2½ ft. between the plants.

Manure water, or an application of artificials, may be given as soon as the roots get well hold of the soil and are growing freely, but where this can only be had in very limited quantities it will be better to defer feeding until the curds are just forming, a little extra stimulant at this stage quickening the development, also adding to the size of the heads.

Early crops may also be had by sowing in the open early in August, potting and giving the plants the protection of a garden frame during the winter months, planting out in sunny borders early in April.

Varieties:—*For Earliest Crop.*—Earliest of All, Early Paris, Eight Weeks, Snowball.

Second Early.—All the Year Round, Early Erfurt, Early Giant, Magnum Bonum, Matchless, Standwell, Walcheren.

Late Autumn.—Autumn Giant, Autumn Mammoth, Eclipse, Emperor.—F. R. C.

CAULIFLOWER DISEASE OF POTATOES.—See under Wart Disease of Potatoes in *Potato Diseases.*

CAULIFLOWER DISEASE OF STRAWBERRIES.—See under Eelworms in *Insect Pests.*

CAUSES OF FUNGOUS DISEASES.—See *Fungous Diseases.*

CAUSEWAY GRASS (*Poa annua*).—See *Poa.*

CAUSTIC POTASH.—See Potassium Hydroxide in *Potash and Potassium Compounds.*

CAUSTIC SODA.—See Sodium Hydroxide in *Soda and Sodium Compounds.* See also *Weed Killers.*

CAUSTIC SODA WASH.—See *Insect Pests: General Methods of Destruction.*

CEANOTHUS.—For the best species see *Climbing and Trailing Plants* and *Shrubs.*

CECIDOMYIA.—See under Cattleya Fly and Crucifer Midge in *Insect Pests.*

CEDAR.—See Cedrus in *Trees.*

CEDAR ELM (*Ulmus crassifolia*).—See *Trees.*

CEDAR OF GOA (*Cupressus lusitanica*). See *Trees.*

CEDAR OF LEBANON (*Cedrus Libani*). See *Trees.*

CEDRELA.—For the best species see *Trees.*

CEDRUS.—For best species see *Trees*

CELASTRUS.—For the best species see *Climbing and Trailing Plants.*

CELERIAC (*Apium graveolens rapaceum.* Nat. Ord. Umbelliferæ).—Unlike celery, this is grown for its large fleshy roots, which when cooked have a distinct celery flavour. It is sure to give satisfaction to those who appreciate celery as a boiled vegetable.

Culture.—Sow and treat as advised in article on *Celery*, excepting when large enough for the open, these may be planted on the level instead of in trenches. Always provide a good rich soil, allowing not less than a foot between the plants. Water very freely in hot weather, and early in November lift the roots and store under eaves in dry soil or ashes.—F. R. C.

[Celeriac should be more often grown than it is.—Editor.]

See also *Apium*.

CELERY (*Apium graveolens.* Nat. Ord. Umbelliferæ).—First-class cultivation of this means not only increased size and weight of the crop but vastly improved table quality. On the other hand, examples grown upon the starvation system, not only lack size, but the quality is often such as to render it useless for almost any purpose.

Preparation of Ground.—Celery is fonder of moisture than almost any other crop. Keeping this fact in mind, where the soil is of a very light or hungry nature, plenty of good rich manure, well-decayed leaves, garden refuse, or lawn mowings from the previous summer should be reserved for adding to the site where this crop is to be grown.

In saying this it is not meant to imply that an extravagant dressing of manure for Celery is absolutely essential, neither is it necessary to dig extra deep trenches for the crop. What is needed is the absolute certainty that plenty of moisture shall reach the roots during the period of active growth, hence the necessity of a trench of some kind. If planted on the level, it would be almost impossible to keep the roots moist in a dry season, but if the trench is made about 12–15 ins. deep it will allow ample space for a good layer of manure, also a covering of not less than 6 ins. of fine soil, and still leave a good margin to form a channel for the water to be poured into. The width of the trenches must be governed by the number of rows it is intended to plant in them. Where but a single row is desired, 10–12 ins. will be ample. For a double row not less than 16 ins. should be allowed. We ourselves having grown three rows of excellent celery in a trench barely 20 ins. wide, would point out to the small grower, that where the rows are situated some considerable distance from the water supply, the double or treble row should always have preference, since they require very little more water than that usually given to a single row. The treble row should also be favoured by those who desire a good supply over a long period; this not only economises space and manure, but it will be found the necessary cultural details may be more quickly, equally, and efficiently performed when these are all together, than is possible when each row is grown in a separate trench.

Sowing.—Where well-grown and perfectly blanched celery is desired early in September, a pinch of seed should be sown in a moderately heated greenhouse during the first fortnight in February; for this sowing one of the white varieties is more likely to give satisfaction than the pink or red. The seed should be sown in a well-drained pan filled to within half an inch of the brim with a compost containing equal parts finely sifted loam, leaf-soil, and coarse silver sand. The seed needs only a very slight covering of fine sand or soil, after which it should be pressed firm and watered through a fine-rosed can, covering the pan with a sheet of glass or brown paper. If the latter is used, be careful to remove it directly the seed shows signs of germinating, but where glass is used, its retention over the pan until the seedlings touch the top will be an advantage. Seedlings need very careful watering, and none but tepid water should be used, always erring on the dry side.

Pricking Off, etc. — The plants are ready for pricking off as soon as two true leaves have been formed. Shallow boxes filled with soil, similar to that the seed was sown in, should be used, putting a layer of well-decayed manure or leaves at the bottom, and after pressing moderately firm, cover the surface with a good layer of sand, or ashes from the garden bonfire. Allow about 2 ins. between the plants, and after a gentle sprinkling overhead, stand the boxes in a light position and shade from bright sun until the condition of the plants shows some roots have been made. After that expose to all possible sunshine and gradually harden off, planting in their permanent quarters early in May.

Maincrop Celery.—The middle of March will be quite early enough to sow seed for the main or winter crop, when the details just given should be carefully followed, until the pricking-off stage is reached. Then, instead of the shallow boxes recommended, it will be an advantage to make up a bed of rich soil over a layer of old hotbed manure in an ordinary garden frame. [We make our soil-bed on a mild hotbed.—EDITOR.] If the seedlings are transferred direct from the seed-pan to this, each being set 2½ ins. apart, and the bed kept well watered and carefully ventilated during bright days, good plants 6 ins. high or more should be ready for planting out about the middle of June; and thanks to the rich soil and room allowed, the plants may each be transferred to their trenches without the slightest check. Before putting them in their final quarters the soil should be trodden very firm, planting always being done with a trowel. Allow about 8–12 ins. between the plants in the row, and 8 ins. or more between the rows.

As soon as the plants get well established in permanent quarters, dryness at the root must be guarded against, as this frequently causes them to run to seed. As growth proceeds many of the outer leaves of each plant will show a tendency to fall, and thus become mixed with others in the next plant. If left long in this state, even if very carefully handled, considerable damage invariably results. A plan far better than taking this risk is to loop up these outside leaves as growth proceeds, never allowing the tie to become so tight as to damage them or impede growth.

Growers who are unable to give the plants liquid manure, will find by tying the leaves together as suggested, dry or artificial manure may be more easily distributed, and afterwards well stirred into the soil, than is possible where tying up is not attempted. Commence giving stimulants as soon as the plants are about 1 ft. high. Weak and often is a golden rule to observe, always keeping whatever is used from direct contact with the leaves, or harm may follow.

One of the very finest liquid manures for celery on a light soil is that from cowsheds, to which a little sulphate of ammonia has been added. In making this, 1 bushel of fresh cow manure is ample for a

40-gallon cask of water. Half an ounce of sulphate of ammonia should be added to each gallon at the time of using. Other good stimulants are soot water and fish guano, using 1 peck of the first to 20 gallons of water, or one handful of the latter to six plants, well stirring it into the soil.

Blanching.—A point to observe when earthing up is always to keep the leaves close together in such a way as to prevent the fine soil getting into the heart of the plant. Thin cardboard or stout brown paper is often preferred to soil for blanching purposes, by busy growers, more particularly those who aim at very early supplies. The paper should not be put round until a good length of stem has been made, successive bands being added as growth proceeds. If preferred the plants may be left unpapered until growth is complete, or six weeks before the celery is required for use. When placing these paper collars around the plants always allow for a little expansion, but put them on in such a way as to ensure absolute darkness to the stem beneath. Plants round which paper has been tied should have additional protection given them before severe frost sets in, or much damage may result when least expected. Even rows properly earthed up with soil or ashes should be protected by means of hay or other light material during exceptionally severe weather.

Insect Pests include Celery Leaf Miner, and Aphis (which are dealt with in the article on *INSECT PESTS*).

Varieties are very numerous and distinct, the best of these being the selection now given: Aldenham Pink, Champion Early, Clayworth Prize Pink, Early Market White, Manchester Red, Sandringham White, Standard Bearer, Sulham Prize, Superb Pink, Sutton's A1, Sutton's Solid White, Wright's Giant Red.—F. R. C.

See also *APIUM*. For METHOD OF BOTTLING see *VEGETABLE BOTTLING*.

CELERY FLY.—See *INSECT PESTS*.

CELERY LEAF SPOT.—See *DISEASES OF PLANTS*.

CELERY STEM FLY—See *INSECT PESTS*.

CELLAR GARDENING.

During the winter the possibilities of a cellar for certain forms of plant culture should not be overlooked. In these underground apartments the temperature often is relatively high, and is usually maintained well above freezing-point even during severe weather. The deficiency of light in a cellar hampers ordinary growth on the part of vegetation, but the darkness is no hindrance to the development of crops that are forced in blanched conditions. Seakale and Chicory do particularly well in such situations. The roots are lifted from the ground and placed in pots or boxes with a little soil. Water should be given somewhat sparingly, as where there is excessive damp, fungoid growths, such as mould, are always likely to appear in a cellar. This plan, in the case of the above vegetables, may be carried out from the fall onwards through the winter.

Another useful plant for the cellar is Dandelion. Strong roots should be lifted from the fields and wayside and potted up, very little soil being required. These plants send up a fine blanched growth that is excellent for salad purposes. Rhubarb is also an ideal crop for the cellar gardener. The clumps are lifted from the ground towards the late fall. If they are exposed to a few nights' frost they will force all the more readily. Finally, the roots are packed closely together on the floor of the cellar, a small amount of rather dry soil being shaken in between them. Moisture is needed, of course, but, until the plants are growing actively, it is safer to keep them on the dry side. Excellent stalks are quickly produced, and these may be secured at a very early date.

Cellars are naturally ideal positions for the growing of Mushrooms, though some objection may be raised by the sanitary officials to the presence of manure in rooms under a dwelling-house. As a matter of fact, the material does not give out much odour if it is stacked out of doors for ten days, and repeatedly turned, before being introduced into the cellar.

Almost the only difficulty which confronts the gardener in the cellar is excessive damp, which leads, as we have said, to the appearance of mould on an extensive scale. Water should be sparingly given to the plants, and this is more quickly absorbed if the chill is slightly taken off. Another useful step is the daily ventilation of the cellar as far as possible. Often by leaving the door and window (if there should be one) open for a short while, the heavy stagnant air, so favourable to fungoid activity, is very much relieved.—S. L. B.

CELMISIA (Nat. Ord. Compositæ). This is a genus of evergreen tufted greenhouse and hardy plants with hard leathery leaves and large Daisy-like flowers. With the greenhouse sorts we need not trouble here; the hardy kinds will, however, thrive in half-shady or sunny positions in the rock garden. They are propagated by seeds sown in gentle heat in March. The best are :—

Celmisia holosericea.—This is an evergreen sub-shrubby plant, bearing hard, leathery leaves in rosettes and making large patches. Flowers white, borne singly on stems and very large. Site, half-shade. Soil peat, loam, and rubble. Flowering Period, June to July. Height, 1 ft.

C. Mackani.—This bears leaves in tufts and has no stems. Flowers white, and large. Site, half-shade. Soil peat, loam, and rubble. Flowering Period, June to July. Height, 1 ft.

C. spectabilis argentea.—This is one of the best sorts and bears its leaves, which are leathery and silvery, in tufts close to the ground. Flowers white and numerous, borne singly on stems. Site sunny. Soil rocky. Flowering Period, June to July. Height, 1 ft.

CELOSIA (Prince of Wales Feathers. Nat. Ord. Amarantaceæ).—This is a most useful plant for greenhouse and conservatory decoration, and very effective in pots, making a grand display during the autumn. Seed should be sown in spring in a little warmth, in light rich loam, leaf-mould, and sand, and the pots should be well drained. Temperature required, 45–50° F.

Greenhouse Species :—*Celosia aurea.*—Yellow plumes. Flowers in August. Height, 1–1½ ft.

C. coccinea.—Crimson and scarlet plumes. Flowers in August. Height, 1–1½ ft.

C. cristata.—This is the Cockscomb, bearing deep crimson flowers in July. Height, 1–1½ ft. See article on *Cockscomb.*

C. pyramidalis.—Brilliant crimson plumes. Flowers in August. Height, 1–1½ ft.

C. Thompsoni magnifica.—Rich-coloured plumes. Flowers in August. Height, 1–1½ ft.

See also *Cockscomb.*

CELSIA.—See *Annuals, Half-Hardy: List of; Cretan Mullein,* and *Perennials, Half-Hardy: List of.*

CELTIS.—For best species see *Trees.*

CEMENT FOR FACING.—See *Mortar.*

CEMETERY GARDENING.

A word must be said on this matter here, as this form of gardening happily is coming more to the fore. Old grim churchyards devoid of any beauty still exist in hundreds, it is true, but the newer ones and the town and city cemeteries are fortunately planned out very differently.

Briefly, the schemes are as follows. First, to arrange the churchyard or cemetery in such a way that on both sides of the central paths or drive up which every funeral party has to come, are flower-beds filled with bright plants; and secondly, to have on the margins of such churchyards or cemeteries hardy flower borders or banks of flowering shrubs. The use of flowering shrubs is specially desirable, since their loveliness appeals to all, and an effort should be made to plant shrubs not only which bloom in the spring, but also in the summer and autumn. (See article *Flowering Shrubs.*) A very large number of bedding plants and hardy perennials are available for use in the beds and borders.

One uncommon idea which the writer saw recently seems worth mentioning here. The cemetery was divided up into several sections, and on both sides of each drive poles or pillars were driven in. Up these grew roses, and drooped down again, giving the drives a peculiarly lovely though solemn appearance. *American Pillar, Crimson Rambler, Dorothy Perkins, Hiawatha,* and *Minnehaha* were all there, and many others too. The Superintendent when questioned said they had roses blooming there from May to November.

Climbing plants might be generously used for clothing the walls of Cemetery Chapels, Churches, and Mausoleums to beautify them. Readers interested will find a host of these plants described in our article on *Climbing and Trailing Plants.*

Money spent on beautifying cemeteries and churchyards by planting as above indicated is never wasted, as although it can do no good to the departed, it will often inspire those who remain to live nobler and purer lives.—E.

CEMIOSTOMA. — See Pear Leaf Blister Moth in *Insect Pests.*

CENCHRUS (Burr Grass. Nat. Ord. Gramineæ).—This is a curious genus of hardy grasses suitable for the wild garden. The best species is *C. tribuloides,* the Hedgehog Grass, which grows about 1 ft. high.

CENTAUREA (Centaury, Knapweed, etc. Nat. Ord. Compositæ).—This genus is so extensive that twenty columns of the *Index Kewensis* are filled with its species and their synonyms. It includes many useful garden plants; some, however, are of botanical interest only and little better than weeds.

Annual Species.—In this very large family there are two groups of well-known annual garden plants, the Cornflowers and the Sweet Sultans, and both are very largely grown for the supply of cut flowers for market. The Cornflowers are very easily raised either from an autumn sowing or a sowing made in March or April. Autumn sown seedlings lightly thinned out, bloom early in the following summer; for groups in the flower border the plants should be thinned to 1 ft. apart. Cornflowers do not take kindly to transplanting.

Sweet Sultans are so beautiful that they repay any extra trouble taken to grow them well. In light soil, especially one containing plenty of lime or chalk, a sowing in autumn will prove successful, and should be made where the plants are to flower. Seedlings raised early in the year in a frame, transferred singly to small pots while quite small, and planted out in May give excellent results. The soil must be good, and as the plants develop it is a good plan to place a few twigs among them to prevent damage from wind.

For varieties of these two popular annuals, see the separate articles dealing with them, namely, *CORNFLOWER* and *SWEET SULTAN*. The half-hardy sorts, such as *C. Cineraria* (Syn. *C. candidissima*), are comparatively unimportant and are omitted; they were once much used for summer bedding.

Biennial Border Species.—These are useful border plants and may be raised from seeds sown in the open ground during May, or in pots placed in a cold frame, planting out the seedlings when they have made a few rough leaves. We recommend the following :—

Centaurea arachnoidea.—A useful yellow July blooming sort, growing about 3 ft. in height.

C. Fenzlii.—This is an erect branching plant bearing large canary yellow heads surmounting its long leafless stems in July and August. Height about 4 ft.

C. iberica.—This is a purple July blooming sort about 1½ ft. high.

C. salmantica.—A purple sort blooming in June and July. It grows about 3 ft. high.

Perennial Border Species.—There are several hundred species which are more or less suitable for hardy flower borders, and all thrive in ordinary garden soil in an open, sunny position. The taller and more weedy sorts may be planted in shrubbery borders or in the wild garden. None are suitable for the rock garden save for the rougher parts, as they are essentially border plants. Propagation is not difficult; it may be effected by seeds sown in the usual way for hardy perennials in the spring or summer; or again, division of the roots is a satisfactory way of increasing one's stock. The less weedy kinds are eminently suitable for cutting, and all may be successfully planted from October to the end of March. The taller sorts need efficient staking, or they fall about and lose much of their beauty. We recommend the following :—

Centaurea alba.—This is a white July flowering sort growing about 2 ft. high. Its variety *deusta* (Syn. *C. deusta*) bears red flowers and grows twice as tall.

C. amara.—This is a purple sort flowering in June and July, and growing about 2 ft. high.

C. atropurpurea.—This is a much darker coloured sort than the above. It blooms about the same time, and averages a yard in height.

C. babylonica.—This is a useful very tall yellow July blooming sort suitable for sunny shrub borders. It grows about 6 ft. in height.

C. Barrelieri.—This purple July blooming sort grows about 1½ ft. high.

C. dealbata (MEALY CENTAURY).—This is a purple July flowering sort growing about 2 ft. high.

C. deusta.—Syn. *C. alba deusta*, which see.

C. eriophora.—This bears yellow blooms from July onwards, and grows 3 ft. high.

C. glastifolia.—This yellow sort blooms in July, and grows 4 ft. high.

C. Jacea (BROWN KNAPWEED).—This purple sort flowering from June to September is not much grown. Its height averages half a yard.

C. macrocephala (GREAT KNAPWEED).—This is a yellow sort flowering in July, and growing a yard in height.

C. montana.—This is an attractive blue July flowering species growing about 2 ft. high. Its flowers are useful for cutting. Two good varieties of it are:—*alba* (white) and *lugdunensis* (blue).

C. nigra (BLACK KNAPWEED).—This is a dark purple species flowering freely throughout the summer, and growing 2 ft. high.

C. Rhaponticum (SWISS KNAPWEED).—A purple summer flowering sort of no great consequence. Height, 2½ ft.

C. ruthenica.—A pale yellow August flowering sort about a yard high.

C. Scabiosa (GREATER KNAPWEED).—This sort bears purplish flowers from June well into the autumn, and grows about 1½ ft. high.

C. uniflora.—This is a purple July flowering sort growing about 1 ft. high.—C. H. C., J. F., & E.

See also *CORNFLOWER* and *SWEET SULTAN*, and under CORNFLOWER in *MEDICINAL HERBS*.

CENTAURIDIUM.—Now included in the genus *XANTHISMA*.

CENTAURY.—See *CENTAUREA* and *ERYTHRAEA*.

CENTIPEDES.—See *INSECT PESTS*.

CENTRANTHUS.—See *VALERIAN*.

CENTRE or DOT PLANTS. — See *CARPET BEDDING*.

CENTROCARPA.—Now included in the genus *RUDBECKIA*.

CENTROSPERMUM.—Now included in the genus *CHRYSANTHEMUM*.

CEONOTHUS.—The same as CEANOTHUS.

CEPA.—Now included in the genus *ALLIUM*.

CEPHALOSTACHYUM.—See *BAMBOOS*.

CEPHALOTAXUS.—For the best species see *TREES*.

CERASTIUM (MOUSE-EAR CHICKWEED, SNOW IN SUMMER. Nat. Ord. Caryophyllaceæ).—A genus of dwarf carpeting plants with silvery foliage, valuable for covering large spaces in the rock garden, rock border, or wall garden. To propagate, divide in autumn or spring; or seeds may be sown in a little heat in March.

Rock Garden Species. — Those usually grown are briefly described below:—

Cerastium alpinum.—A woolly-leaved silvery plant. Flowers white. Site sunny ledge. Soil gritty sandy loam. Flowering Period, June to July. Height, 3 ins.

C. Biebersteinii.—A very free-growing, white-leaved species soon covering a large area. Flowers white. Site sunny. Soil sandy loam. Flowering Period, May to July. Height, 6 ins.

C. tomentosum. — Leaves small, silvery, evergreen. Flowers white. Site sunny ledge. Soil gritty loam. Flowering Period, June. Height, 3 ins.

CERATOCEPHALUS.—Now included in the genus *RANUNCULUS*.

CERATOCHLOA.—Now included in the genus *BROMUS*.

CERATOSTIGMA (LEADWORT. Nat. Ord. Plumbaginaceæ). — A late-flowering plant, useful for the rock garden. It thrives on a rocky bank in ordinary soil, and is propagated by dividing the roots in autumn.

C. plumbaginoides (Syn. *Plumbago Larpentae*).—A bushy species, the leaves of which turn bronze colour in autumn. Flowers cobalt blue. Flowering Period, September to October. Height, 1 ft.

NEW SPECIES.

Ceratostigma Willmottiana.—This bears light blue flowers throughout the summer, and grows about 6 ft. high.

CERCIS.—For best species see *TREES*.

CEREFOLIUM.—Now included in the genus *ANTHRISCUS.*

CEREUS.—See *CACTI.*

CERINTHE (HONEYWORT, Nat. Ord. Boraginaceæ).—This is a small genus of attractive hardy annual plants growing with remarkable freedom in ordinary garden loam. The best species are *C. aspera* and *C. major* (Syn. *C. gymnandra*). The first bears purple and yellow blooms, while the second is pure yellow. Both bloom in July, and average 2–3 ft. in height.

CEROPTERIS.—Now included in the genus GYMNOGRAMME, for which see *FERNS AND FERN GARDENING.*

CETERACH.—Now included in the genus ASPLENIUM, for which see *FERNS AND FERN GARDENING.*

CEUTORHYNCHUS.—See TURNIP AND CABBAGE GALL WEEVILS in *INSECT PESTS.*

CHAFERS.—See *INSECT PESTS.*

CHAIRS AND AWNINGS.—See *GARDEN FURNITURE.*

CHALCIDIDÆ.—See under CATTLEYA FLY in *INSECT PESTS.*

CHALK.

This is, chemically, carbonate of calcium ($CaCO_3$), but it is more often called carbonate of lime, which name is undesirable as well as incorrect, since lime is not in itself a metal, but an oxide of the metal calcium. Chalk is useful to the gardener in several ways. It is extremely useful as a mild antidote for acids on rich soils, and can be safely applied heavily without fear of loss of much valuable plant food, which would take place where quicklime or slaked lime were applied. Animal manure and chalk can be applied together, but lime and dung cannot, owing to chemical action; basic slag and chalk also can be applied together, but not basic slag and quicklime, owing to chemical action again; and finally, chalk can be mixed with ammonia compounds to neutralise the acid effect they have on soils, but quicklime would, if mixed with them, drive off all the ammonia. Chalk can further be used in reclaiming for neutralising the harmful vegetable acids in peat without injuring the rich humus it contains; if quicklime were used for the purpose much of the valuable humus would be destroyed.

Chalk is a very mild and safe material. It can be applied (if finely ground) at any time, and beneficial results have been obtained by hoeing chalk into the soil among flowers and vegetables a few days after they have had a somewhat heavy feed of nitrogenous or ammoniacal fertilisers. Chalk is the stand-by of the gardener who works upon a very sandy soil; on such, a dressing of quicklime or slaked lime would be fatal, and would effectually remove any little humus which the soil had been able to manage to retain. Chalk, especially if it is obtained in the form known as *Chalk-marl,* helps to bind such very open soils together, and makes them hold moisture and manure much better. In this case the chalk, when delivered, will be in lumps or irregular masses. These have to be spread out on the ground in the autumn or not later than 1st December, so that the frost can get at them and break them down. In the spring a few blows with the spade will soon finish the crushing. After that, the chalk can be dug in with manure. From 3–6 stones of chalk per sq. rod of ground can be safely used.—E.

See also CALCIUM CARBONATE in *LIME COMPOUNDS,* and *SOIL IMPROVEMENT.*

CHALK-MARL.—See *CHALK.*

CHALK MILK-WORT (*Polygala calcarea*).—See *POLYGALA.*

CHALK PLANT.—See *GYPSOPHILA.*

CHAMAEBUXUS.—Now included in the genus *POLYGALA.*

CHAMAECYPARIS.—Now included in the genus CUPRESSUS, which see in *TREES.*

CHAMAEDOREA.—For the best species see *PALMS.*

CHAMAEDRYS.—Now included in the genus *TEUCRIUM.*

CHAMAEMELUM.—Now included in the genus *MATRICARIA.*

CHAMAENERION.—Now included in the genus *EPILOBIUM.*

CHAMAEPEUCE.—Now included in the genus *CNICUS.*

CHAMAEROPS.—For the best species see *PALMS.*

CHAMITEA.—Now included in the genus SALIX.

CHAMOMILE.—See *ANTHEMIS* and *MEDICINAL HERBS.*

CHANTARELLE.—See EDIBLE FUNGI in *FUNGI.*

CHARACTER OF BEDS.—See *BEDS: SHAPE AND CHARACTER OF.*

CHARCOAL.

This finds varied use in the gardener's hands, but is not of any very great importance. It is an ingredient of potting soils for many plants, and a couple of pots full of charcoal dust per bushel of soil, or even more of the lump charcoal, can after crushing be used. Lump charcoal can be put instead of potsherds at the bottom of pots for drainage purposes, and it ensures the soil being kept sweet. It can also be put into vases for keeping the water of cut flowers fresh and sweet. One small lump in the bottom of each vase is usually quite sufficient for the purpose, and is said to be better even than permanganate of potash.

Out of doors, charcoal dust can be used in the preparation of seed-beds. It may be used either alone or mixed with wood ashes. It can be forked in freely round extra choice plants.

There is a form known as *animal charcoal,* but the gardener has no use for this. The remarks above apply only to wood charcoal.—E.

CHARIEIS.—See *CAPE ASTER.*

CHATHAM ISLAND FORGET-ME-NOT (*Myosotidium nobile*).—See *MYOSOTIDIUM.*

CHEDDAR PINK (*Dianthus caesius*).—See *DIANTHUS.*

CHEIMATOBIA.—See WINTER MOTHS in *INSECT PESTS.*

CHEIRANTHUS (Nat. Ord. Cruciferæ).—A very large number of species of this pretty little genus are described in the older gardening works, but modern research has proved them to be synonymous with species of other genera. According to the Kew Hand-list *Cheiranthus Chius* is now *Malcomia Chia*; *C. flexuosus* is *M. flexuosa*; *C. incana* is *Matthiola incana*; *C. littoreus* is *Malcomia littorea*; *C. maritimus* is *M. maritima*; and *C. sinuatus* is *Matthiola sinuata.* The species described below are hardy perennials suitable for rockwork or the warmest parts of the perennial border, and thrive in light sandy soil. They are best propagated by seeds sown in the spring or summer, or by autumn or spring division of the roots. In cold districts it is advisable to defer planting till March.

Cheiranthus Allionii.—This lovely sort bears deep orange flowers from May onwards, and averages 12 ins. high.

C. alpinus.—This is the popular ALPINE WALLFLOWER of the nurserymen, bearing pale yellow or sulphur-yellow flowers in May and June, and growing 6 ins. high.

C. Cheiri. See article on *WALLFLOWERS.*

C. Marshallii.—This bears glorious orange flowers throughout the early summer, and grows 1–2 ft. high.

C. Menziesii.—This is a useful sort bearing clear purple flowers from April onwards to June. It grows 6–8 ins. high.

CHELONE (Nat. Ord. Scrophulariaceæ).—This genus is coming to the front, but a great many of its species are now included in *PENTSTEMON*, to which reference should be made. Even the well-known *Chelone barbata* is now included in the Pentstemons. They may be used for the usual purposes in the herbaceous border, etc., though in very cold districts some winter protection is desirable.

Culture.—Chelones are not particular as to soil provided it is on the light side. Some well-decayed humus should be supplied if the best flowers are wanted. They do well in south borders, but may also be planted in the less overgrown and sunniest parts of the wild garden and in the rock garden. They may be increased by seeds sown in the usual way, by cuttings made in the way described under *PROPAGATION OF PLANTS*, and by division of the roots in the autumn or spring. Plant any time from early November onwards, or in cold localities delay planting till the spring.

What to Grow.—We recommend the following :—

Chelone barbata.—This is now named *Pentstemon barbatus.* See article on *PENTSTEMON.*

C. cheilanthifolia (Syns. *C. centranthifolia* and *Pentstemon centranthifolia*). See article on *PENTSTEMON.*

C. glabra.—A useful white August blooming sort averaging about 4 ft. in height. Its variety *obliqua*, by some considered as a separate species, is purple.

C. Lyoni.—This is a purple August flowering sort about 4 ft. high.

C. mexicana.—An attractive scarlet sort, blooming in the early summer (June). Height, 1 ft.

C. nemorosa.—A dwarf purple flowered sort, coming in during August, and averaging 12–15 ins. in height.

C. obliqua.—This is, as already mentioned, by some considered a separate species. It appears to be only a variety of *C. glabra*, to which it is very similar.

C. speciosa.—A reddish sort blooming in August and continuing at times into the early autumn. It averages about 4 ft. in height.

See also *PENTSTEMON.*

CHEMICALS FOR GARDENS.—See *GARDEN CHEMICALS.*

CHEMISTRY FOR GARDENERS.

Chemistry is the science that deals with the changes which matter undergoes. There are also physical changes which take place in connection with matter. The latter are, however, only changes in form, whilst the former are changes in composition.

Acids, Bases, and Salts.—Readers will find constant references to these elsewhere, so a few words explaining exactly what they are may be useful. An *acid* considered chemically contains hydrogen, but for our purposes we may say that it has the power of neutralising a base. A *base*, on the other hand, has properties opposite to those of an acid. If the two combine, a *salt* is formed. As an example of such changes spirits of salts (hydrochloric acid) may be taken. It has the characteristic properties of an acid, for it is sour to the taste, and it turns blue litmus paper red. If now caustic soda (a base which turns red litmus blue) be added, the properties of the latter disappear at a certain point, for the soda, which is a base, has combined with the acid to form common salt (sodium chloride).

Chemical changes such as the above are of great importance to gardeners, and an example of a change where undesirable compounds are removed from the soil by this means, is found in liming the land to neutralise the poisonous vegetable acids it may contain after over-manuring.

The chemist tells us there are two classes of matter—*organic* and *inorganic*. By the former is usually understood those substances which have been produced by living organisms (animal or vegetable), whilst inorganic matter has been produced without the aid of a living plant or animal. The distinction between organic and inorganic material is useful, and if by organic is understood what we regard generally as animal or vegetable products, the term is not likely to be wrongly used. Strictly speaking, however, organic chemistry is the branch which deals with the compounds of the element carbon.

A great many of the changes which give rise to new compounds take place in solution, and water is the solvent that most commonly comes into consideration. Some elements or compounds do not dissolve in water nearly so easily as others; but nothing is really insoluble, although such materials as glass, metals, etc., only dissolve after they have been heated in water for lengthy periods.

In the soil, as also in the plant, water plays a most important part as a solvent and as an aid to chemical changes. Generally speaking, hot water dissolves materials better than cold; the hotter the water gets the greater its power is of dissolving. Also, if a little acid is added, many compounds otherwise insoluble dissolve readily. A good illustration of this last point is shown in the ease with which water containing carbon dioxide gas (which compound is a weak acid) acts upon many minerals in the soil and dissolves them, though pure water does not dissolve them at all.

In view of the special importance of certain elements and their compounds in gardening, a few short notes on these are given below. For further particulars, reference must be made, however, to some book on systematic chemistry.

Oxygen.—This element (a gas existing in air) is of first importance, as it enters so easily into combination with other elements. When carbon burns, it combines with oxygen and yields carbon dioxide gas. When an animal breathes, it takes in oxygen and gives out carbon dioxide gas. A plant, however, takes in carbon dioxide gas and gives out oxygen; and in the soil oxygen from the air produces or assists in the production of new compounds. Hence the wisdom of rough digging in the winter to expose as large an area of the soil to the air as possible.

Nitrogen.—This is the element which makes up practically four-fifths of the air. It differs very markedly from oxygen in that it is, whilst in the free state, an inactive gas. When combined with other elements nitrogen gives rise to very different substances, some of them most active, *e.g.* aqua fortis (nitric acid), ammonia, etc., whilst others, such as nitrate of soda and nitrate of potash, are of great importance to the plant and the animal. Both plants and animals require nitrogen, and as it is only the leguminous plants which have the power of using nitrogen gas, the use of nitrogenous manures, such as nitrate of soda and sulphate of ammonia, is widespread. In fact the whole group of nitrogenous manures (see article on *MANURING, PRINCIPLES OF*) is of fundamental interest and value.

Carbon.—This is another important element from the gardener's point of view. In a pure form carbon is seen in charcoal made from sugar. It is the compounds of carbon which are of more interest. As already mentioned, organic chemistry is nowadays regarded as dealing with the compounds of carbon.

Carbon dioxide gas, which is formed when carbon unites with oxygen, is the gas produced when coal or wood burns; also carbon dioxide is breathed out by plants and animals day and night. Also carbon dioxide gas is the source from which the plant, thanks to its green leaf and the power of sunshine, prepares sugars and starches, which are known as *carbohydrates.* Cellulose is another carbohydrate; it makes up the woody or stem portion of the plant. The carbohydrates all contain carbon, oxygen, and hydrogen.[1]

Phosphorus.—This important element is related chemically to nitrogen, and it is also a substance of great value to the plant. The element itself is of no use to the gardener, but it combines readily with oxygen, giving an oxide which dissolves in water and thus produces *phosphoric acid.* When a base is added, salts called phosphates are produced. There are many of these, some containing more acid than others. Those with the greatest amount of acid dissolve in water most freely, and are thus of great value for plant life. They are known as *acid manures*. Insoluble phosphates may be made soluble by the addition of sulphuric acid, which robs the compound of part of its base, and leaves an acid phosphate (soluble) and usually an insoluble sulphate.

---

[1] The last two elements are present in all carbohydrates in the proportions in which they form water. This is easily shown by adding strong sulphuric acid to one of them, as, for instance, sugar. Chemical action sets in, a mass of pure black carbon is formed, and dilute sulphuric acid (*i.e.* acid to which some water has been added) remains.—EDITOR.

Other Elements.—The elements described above have all been *non-metallic*, and in the same group we include many others, such as chlorine, sulphur, silicon, and hydrogen, which are of importance, but which must be passed over here. The *metallic* elements, as the name implies, have the general properties of metals, and a few notes on some of them are given below.

CALCIUM.—This element occurs in limestone, which is a carbonate of calcium, and quicklime, which is calcium oxide. Liming consists of applying this element to the soil in a suitable form. See article on *LIME*.

Calcium combines readily with acids and forms salts. Those of greatest importance are included in our article on *LIME COMPOUNDS*.

IRON.—Plants require this element in order that the green colouring matter of their leaves may be properly formed. Iron salts are also used in spraying mixtures. Iron is more fully dealt with in our article *IRON AND IRON COMPOUNDS*.

MAGNESIUM is closely allied to calcium.

POTASSIUM AND SODIUM.—These are two elements which form salts of great economic importance. Both elements are widely distributed, but potassium (which is abundant as a double silicate in clay) is, of course, the most important. Plants absorb potash from the soil, and when they are burnt the potash remains in their ash. In addition to its being found in clay, potash also occurs in large deposits, as at Stasfurt, from which kainit is obtained. These deposits also supply some of the impure sulphate and muriate (or chloride) of potash used as artificial fertilisers. Sodium also occurs in nature very freely, chiefly as common salt. From this caustic soda (used in spraying), carbonate of soda (or washing soda), and indeed most other compounds, can be easily made. The chief potash and soda compounds, with instructions for their use, are given in our articles on *POTASH AND POTASSIUM COMPOUNDS*, and *SODA AND SODIUM COMPOUNDS*.

AMMONIA.—This, though a compound of nitrogen and hydrogen, is regarded by chemists as if it were a metallic element, and it certainly forms many compounds with acids (such as sulphate of ammonia), of great use to the gardener. It is dealt with more fully in our article *AMMONIA AND AMMONIUM COMPOUNDS*.—W. GDN.

See also *EDUCATION AND GARDENING*.

CHENOPODIUM (GOOSEFOOT. Nat. Ord. Chenopodiaceæ).—This is a genus of hardy annual and hardy perennial plants of very little importance in gardens. Many species are troublesome weeds. *C. Bonus-Henricus* is popularly known as MERCURY, GOOD KING HENRY or ALL-GOOD. It is used as a salad or vegetable, and has its culture fully described in our article on *MERCURY*. Other species we must mention are *C. album*, the well-known weed FAT-HEN, described in our article on *WEEDS*; *C. Botrys*, the HIND-HEAL; *C. hybridum*, the MAPLE-LEAVED GOOSEFOOT; and *C. Quinoa*, the PETTY GRASS. For detailed descriptions of these and numbers of others, large botanical works should be consulted.

CHERLERIA.—Now included in the genus *ARENARIA*.

CHERMES.—See LARCH APHIS in *INSECT PESTS*.

CHEROKEE ROSE (*Rosa laevigata*).—See *ROSE SPECIES*.

CHERRIES : Indoor Culture.

These fruits belong to the genus *Prunus* and the Nat. Ord. Rosaceæ. They succeed in almost any form, and are most beautiful when in flower and fruit; either grown in pots as bushes, pyramids, cordons, or when planted out and trained to a trellis about 18 ins. from the glass. The soil and mode of potting is the same as recommended for Peaches; a little more bone-meal may be added with advantage to the compost. They require firm potting, as newly-potted trees are apt to make too vigorous growth, and abundance of water is necessary.

By careful pinching the trees soon become one mass of fruiting spurs. Being subject to fly and grubs, these must be looked for and killed, or they soon destroy the crop. What might be termed forcing with fire-heat or anything approaching close confinement is fatal to the crop. All that is needed is a constant circulation of air, with 40° F. at night and 50° F. by day, rising to 45° F. at night when the flowers open, and 55° F. by day, which should not be exceeded, until stoning has passed. A gentle warmth in the pipes i beneficial during the flowering period, and fertilisation of the flowers is important. *Elton*, *Guigue d'Annonay*, *Governor Wood*, and *Mayduke* are excellent pollen producers. Frequently syringe the trees during the time the fruits are swelling, but not when in flower or during the ripening of the fruit. All the varieties do well in pots, and the plants should be removed to the open air as soon as the fruits are gathered, and potted into larger pots as soon as the wood shows signs of changing for ripening.

Varieties.—*Bigarreau de Schreken.*—A very fine early black.

Black Tartarian.—A large and handsome fruit, and great bearer.

Early Rivers.—An excellent hardy early variety.

Emperor Francis.—A fine late variety.

Geant de Hedelfingen.—A large black of fine flavour.

Napoleon.—An excellent late variety.

Besides the above, many other good varieties might be included with advantage in large collections.

F. J.

CHERRIES : Outdoor Culture.

These fruits are not well suited for small gardens, as standard trees take so much room and shade other crops, and birds often get all the fruit before it is fully ripe. They may be grown to perfection on a wall with east aspect, as in that position they can be netted. The Cherry resents pruning, and the trees "gum" where cutting is done, so that all regulating of shoots should be done when in full growth, so that the wound can heal over. For general hints on planting, etc., reference should be made to our article on *FRUIT CULTURE, HARDY: GENERAL CONSIDERATIONS.*

Varieties.—A good selection for walls or fences is given below :—

Black Tartarian (Circassian).—Very large; the latest of all. Rich flavour.

Frogmore Bigarreau.—Red and yellow, mid-season variety. Profuse bearer,—rich and sweet.

Governor Wood.—Pale red and yellow. Very thin skin. Rich flavour. Free bearer.

Napoleon Bigarreau.—Very large, late red and yellow: the best late pale cherry.

River's Early.—Black. Profuse bearer, of weeping habit. Rich and delicious, lasting a long time in perfect condition.

Waterloo.—Black, rather late. Considered the best flavoured of all. Good bearer.

Should it be desired to have STANDARD CHERRIES, *Frogmore* and *Waterloo* are the best, but *Mayduke* is more compact in growth. The fruit of this is rich purple, and is ready early.

The Morello makes a good small standard, and is grand as a bush also.—G. B.

CHERRY.—See *CHERRIES*, and under PRUNUS in *TREES*.

CHERRY BIRCH (*Betula lenta*).—See *TREES*.

CHERRY GUMMING.—See GUMMOSIS in *DISEASES OF PLANTS*.

CHERRY LAUREL (*Prunus Laurocerasus*).—See *TREES*.

CHERRY LEAF SCORCH.—See *DISEASES OF PLANTS*.

CHERRY PIE.—A synonymous English name for HELIOTROPE.

CHERRY PLUM (*Prunus cerasifera*).—See *TREES*.

CHERRY SCAB.—See *DISEASES OF PLANTS*.

CHERVIL.—See *ANTHRISCUS* and *SALAD PLANTS*.

CHESHIRE PRUNE.—See *DAMSONS AND BULLACES*.

CHESTNUT.—See *NUT CULTURE*. See also the genus ÆSCULUS in *TREES*.

CHESTNUT OAK (*Quercus Prinus*).—See *TREES*.

CHICKASAW PLUM (*Prunus angustifolia*).—See *TREES*.

CHICKLING VETCH (*Lathyrus sativus*).—See *LATHYRUS*.

CHICKWEED.—A troublesome annual weed. See *WEEDS*.

CHICKWEED WINTER-GREEN (*Trientalis europaea*).—See *TRIENTALIS*.

CHICORY.—See *CICHORIUM*, *MEDICINAL HERBS*, and *SALAD PLANTS*.

CHILDREN'S GARDENING.

This is too big a subject to launch upon in the present edition excepting in its side branch *SCHOOL GARDENING*, on which a separate short article appears. We recommend parents who are interested in encouraging a taste for gardening in their young folks to get *The Children's Book of Gardening*, by Mrs. Alfred Sidgwick and Mrs. Poynter, published at the office of this Dictionary.

CHILE SALTPETRE.—See SODIUM NITRATE in *SODA AND SODIUM COMPOUNDS*.

CHILI.—See *SALAD PLANTS*.

CHILI NETTLE (*Loasa lateritia*).—See *LOASA*.

CHILI PINE (*Araucaria*).—See *TREES*.

CHILIAN ARBOR VITAE (*Libocedrus chilensis*).—See *TREES*.

CHILOCHLOA.—Now included in the genus *PHLEUM*.

CHIMNEY BELLFLOWER (*Campanula pyramidalis*. Nat. Ord. Campanulaceæ).—Although a short-lived perennial, the Chimney Bellflower does best when grown as a biennial. Well-grown plants form pyramids of bloom 3–5 ft. high during the July and August of the second year from seed. Numerous side branches from the base get nearly as tall as the central stem. The flowers are of some shade of light blue, and pure white in the variety *C. p. alba*. Seeds may be sown in the open in May, or in boxes in a cold frame during May, June, or July, the sooner the better to get strong plants before autumn. Transplant the seedlings as soon as they are fit to handle, in order not to delay growth. They may be put in their flowering positions in borders at the time of transplanting or in October. At that time large plants may be potted in 7-inch or 8-inch pots to bloom in the greenhouse the following year. Keep them in a cold frame during winter. Use a compost of good loam, some well-rotted manure, and sand, and feed with weak liquid manure when the flower stems begin to develop.

What to Grow.—Below is a selection of the best sorts:—

Campanula pyramidalis.—A blue sort, flowering in July and August. Height, 3–5 ft.

C. p. alba.—A white sort, flowering in July and August. Height, 3–5 ft.

C. p. compacta.—A deep blue sort, flowering in July and August. Height, 3 ft.

C. p. compacta alba.—A white sort, flowering in July and August. Height, 3 ft.—J. F.

CHIMONANTHUS. — For the best species see *CLIMBING AND TRAILING PLANTS* and *SHRUBS.*

CHINA ASTER.—See *ASTER.*

CHINA ROSES.—For the best varieties see *ROSE CLASSES.*

CHINCAPIN OAK (*Quercus prinoides*). See *TREES.*

CHINESE ARBOR VITAE (*Thuya orientalis*).—See *TREES.*

CHINESE ARTICHOKE (Syns. CROSNES, JAPANESE ARTICHOKE, STACHYS, etc.) (*Stachys Sieboldi.* Nat. Ord. Labiatæ).—This somewhat peculiar-formed vegetable is but little known to English gardeners, many not being aware of its existence. Others, having to provide a large and varied supply of fresh vegetables, find in this a useful addition to the none too large variety of winter vegetables, while many first-class cooks find the tubers of great value for soup, and for what are termed " made dishes."

Culture.—Early April is soon enough to plant. Allow not less than a foot between the rows, and 8–9 ins. between the sets, each of these being buried with about 4 ins. of soil. A light loam is better than a strong clay, but the latter will give good returns if dressed with ashes.

During the summer months the space between the rows should be kept free from weeds, but even in the driest times, artificial watering need not be resorted to. Like the more popular Jerusalem Artichoke (or, as many men term it, Sunroot), these do not attain full size until the end of the growing season. They may, however, either be left in the ground to be dug as required, or lifted and stored in boxes of sand or ashes. A good covering is essential, since the roots, on full exposure to light and air, very soon lose their culinary value, and they are then useful only as food for fowls or pigs.—F. R. C.

CHINESE BELLFLOWER.—A name applied to *PLATYCODON*, which see.

CHINESE CABBAGE (*Brassica sinensis.* Nat. Ord. Cruciferæ).—This is a native of China, where it is known as the Pak-choi. Although a true Cabbage, in appearance it more resembles the Endives and Lettuces than our Cabbages, Kales, and Broccolis.

It has, for a long time, been popular in France, Italy, and Southern Europe, but has not made headway in England and has not been cultivated to any extent before the beginning of this century.

Culture.—Coming, as it does, from China, this vegetable is fond of a mild climate and cannot be safely recommended for growing in more exposed northern places, such as Scotland, or, indeed, the north-eastern counties of England. In the South and West of England, South Wales, and in the South and West of Ireland, the Chinese Cabbage may be easily and successfully cultivated by the average gardener or amateur.

The type—Pak-choi—is upright in growth, like a Cos Lettuce, and not unlike the Perpetual or Spinach Beet, which is grown for its leaves. The leaves are oblong, of a dark pea-green colour, and fleshy, the mid-ribs being of a creamy-white, swollen to a considerable thickness, and very succulent.

The best variety is the *Pe-tsai*, or *Improved Heading Chinese Cabbage.* This sort is leafy, vigorous in growth, and self-blanching: it can easily be grown about 3–4 lb. in weight. It should not be sown before about the end of July for winter use, otherwise it quickly runs to seed. A light, porous soil suits it best, and the situation chosen for it should be a sheltered one. It should be sown in drills about 18 ins. apart, and the plants thinned out to about a foot from each other, and kept clean and free from weeds to allow the air to play around them. In dry weather copious waterings should be given between the rows, for the leaves should never be allowed to wilt or become "leathery," brittleness and succulence being the desirable conditions of success.

In cooking it as a vegetable for table, it is better steamed, with a small piece of butter in the bottom of the pan. In France the leaves alone are often boiled like Cabbage, while in England the mid-ribs are most frequently cooked and served up like Asparagus.

Pe-tsai makes an excellent salad, and, as a variation from Lettuce and Endive, is a desirable adjunct to the salad-bowl. The quicker it is grown the better, it being then more tender and succulent. The richer the soil, therefore, and the warmer the situation, the better will be the result.—A. H.

CHINESE CHERRY (*Prunus japonica*). See *TREES*.

CHINESE CHESTNUT (*Æsculus chinensis*).—See *TREES*.

CHINESE JUNIPER (*Juniperus chinensis*).—See *TREES*.

CHINESE LARCH.—A name applied to the genus PSEUDOLARIX. See *TREES*.

CHINESE PRIMULA (*Primula sinensis*).—See *PRIMULA*.

CHINESE QUINCE (*Cydonia sinensis*). See *SHRUBS*.

CHINESE WISTARIA (*Wistaria chinensis*).—See *CLIMBING AND TRAILING PLANTS*.

CHIONANTHUS.—For the best species see *SHRUBS*.

CHIONODOXA (GLORY OF THE SNOW. Nat. Ord. Liliaceæ).—This is a genus of pretty little blue, or blue and white, flowering plants, growing about 6–10 ins. in height, and blooming in early spring just before the blue squill or *Scilla sibirica*. They are useful for edgings, for clumps in borders or rockwork, or for naturalising in short grass.

Culture.—Any good garden soil suits them, but as they do not like being disturbed, newly bought bulbs seldom do themselves justice at their first time of blooming. If possible so arrange matters that Chionodoxas can be left undisturbed for a number of years. They seed very freely, and unless the seed pods are picked off before they ripen and burst, an infinite number of tiny seedlings will soon appear, and these, once they have got a foothold, are very difficult to eradicate. If there is no objection to these pretty little blue flowers coming up "all over the place," leave the seed pods alone, and nature will do the rest. Then, in a few years' time, borders may be dug and re-dug, without doing much harm to the Chionodoxas. A certain number are sure to survive and bloom.

Species and Varieties.—*Chionodoxa gigantea*[1] has generally only two or three large flowers on a stem; in colour these are mauvey-blue. Sometimes pure light blue forms are met with. There is also a white on the market, but it is hard to get. Both forms flower in March, and average 4–8 ins. high.

C. Luciliae has blue flowers in March which have a prominent white eye. Its variety *Tmoli* has deeper coloured flowers and blooms in April. There is also a white form, but it is very scarce. They average 6–10 ins. high.

C. sardensis[2] is one of the best of all early spring flowering bulbs. It has deep, rich blue flowers without any white in the eye as in *C. Luciliae*, which are freely produced in March. It grows 6–8 ins. high.—J. J. & E.

---

[1] This is regarded as a species by gardeners and horticultural traders, but in reality it is the variety *gigantea* of *C. Luciliae*.—EDITOR.

[2] This is regarded as a species by gardeners and horticultural traders, but in reality it is the variety *sardensis* of *C. Luciliae*.—EDITOR.

CHIP TOP-DRESSINGS.—See *TOP-DRESSING.*

CHITTAM WOOD (*Rhus cotinoides*).—See *SHRUBS.*

CHIVES.—See *SALAD PLANTS.*

CHLORA (Nat. Ord. Gentianaceæ). This is a genus of about eight pecies of plants which are not quite hardy. On light sandy soils they behave as annuals, but in more genial mediums (especially if sown late out of doors) they flower the second year and thus behave as biennials.

Probably the best way of raising them is to sow the seeds in pots in a cold frame in March or April and plant out in May, though seeds may also be sown outside on the rockery or in the open borders in April.

We recommend the following :—

Chlora grandiflora.—This bears flat-topped trusses of yellow flowers of considerable beauty from June to July, and averages 6–12 ins. in height.

C. imperfoliata.—This is not so attractive as the last, but bears useful bright yellow flowers from June to August, and grows 12 ins. high.

C. perfoliata (YELLOW CENTAURY).—This is probably the best known sort, with its brilliant yellow flowers in July and August, on plants 12–18 ins. high.

C. quadrifolia.—This is another useful sort bearing yellow flowers from June to August, and growing 12 ins. in height.—J. F.

CHLORATE OF POTASH.—See POTASSIUM CHLORATE in *POTASH AND POTASSIUM COMPOUNDS.*

CHLORIDE OF AMMONIA.—See AMMONIUM CHLORIDE in *AMMONIA AND AMMONIUM COMPOUNDS.*

CHLORIDE OF CALCIUM.—See CALCIUM CHLORIDE in *LIME COMPOUNDS.*

CHLORIDE OF LIME.—See CALCIUM HYPOCHLORITE in *LIME COMPOUNDS.*

CHLORIDE OF MAGNESIA (MAGNESIUM CHLORIDE).—A reference to this is made in *MAGNESIA AND MAGNESIUM COMPOUNDS.*

CHLORIDE OF POTASH.—See POTASSIUM CHLORIDE or MURIATE in *POTASH AND POTASSIUM COMPOUNDS.*

CHLORIDE OF SODA.—See SODIUM CHLORIDE in *SODA AND SODIUM COMPOUNDS.*

CHLORIS (GREEN GRASS. Nat. Ord. Gramineæ).—This is a genus of hardy and half-hardy grasses not suitable for general garden purposes, and thus to describe species would be beyond our scope. *C. barbata* and *C. elegans* are pretty bouquet grasses used by some nurserymen, but we should prefer to use LOVE GRASS (*Eragrostis elegans*), described under the latter name in our article on *ORNAMENTAL GRASSES*, for this purpose.

CHLOROSIS. — See *DISEASES OF PLANTS.*

CHOICE OF SITE FOR GARDENS.—The geological aspect of this matter is briefly outlined in *GARDEN GEOLOGY.*

CHOISYA.—For the best species see *CLIMBING AND TRAILING PLANTS* and *SHRUBS.*

CHOKE-BERRY (*Pyrus arbutifolia*).—See *TREES.*

CHOKE CHERRY (*Prunus virginiana*) See *TREES.*

CHONDROSEA.—Now included in the genus *SAXIFRAGA.*

CHOU DE BURGHLEY (*Brassica Hybrid.* Nat. Ord. Cruciferæ).—This is one of the most useful additions to the list of winter vegetables, but up till now it appears to be but little grown by the amateur or small grower, yet it is to such as these the plant has special recommendations. Now that the true value of fresh vegetables is becoming more fully recognised, we may expect this plant to receive the attention it deserves.

In appearance this is quite distinct from the ordinary winter greens, combining the qualities of a Cabbage and Broccoli, being equal in hardiness to the first-named, but the large leaves enclose the head of a Broccoli and thus protect it. Every part of the plant may be eaten, the green leaves being of a decidedly better flavour than ordinary Cabbage.

Culture.—Seed should be sown in the open garden towards the end of March, a rich seed-bed being equally as important as thin sowing. When the young plants have grown 6 or 7 ins. high, it will be better to transfer them to a temporary nursery bed rather than risk ruination of the crop through weak growth resulting from an overcrowded seed-bed. As the plants are less able to withstand severe frost than the more common Kales, the importance of short sturdy growth can hardly be over-estimated.

The summer quarters for the plants should be well manured, and the soil dug to a good depth. Not less than 30 ins. between the rows should be allowed, and whenever possible the same distance between the plants, giving copious waterings during dry weather. At the approach of severe frost, protect all heads which are rapidly developing Broccoli inside with tufts of hay, straw, or paper.—F. R. C.

CHRIST'S THORN.—The genus Paliurus. See *Shrubs*.

CHRISTMAS DAISY (*Aster grandiflorus*).—See footnote to article on *Aster*.

CHRISTMAS ROSE (*Helleborus niger*). See *Helleborus*.

CHRYSALIDOCARPUS.—For the best species see *Palms*.

CHRYSANTHEMUM (Nat. Ord. Compositæ).—**Annual Species.**—These, *i.e.* the Corn Marigolds and Crown Daisies, may easily be raised from seeds sown out of doors in March or April, but the garden varieties are more usually treated as half-hardy annuals and raised from seed sown in heat in January or February. The following are worthy of inclusion in every garden :—

Chrysanthemum carinatum.—This bears white and purple flowers through the summer, and averages 2 ft. in height.

C. coronarium.—This bears yellow flowers throughout the summer and autumn, and grows 2–3 ft. high.

C. multicaule.—A dwarf yellow summer flowering species, averaging 1 ft. high.

C. segetum.—This is a bright yellow continuously summer flowering sort, averaging 1½ ft. in height.

C. viscosum.—This also is a yellow summer flowering sort, averaging 1½ ft. in height.

Perennial Border Species.—Certainly the hardy perennial Chrysanthemum, or Ox-Eye Daisy, is one of our easiest border flowers to grow, succeeding anywhere in good soil in a sunny site. Most sorts are splendid for cutting, lasting well in water. They come into bloom early, though usually considered autumn flowers, and continue for a long period, a single plant often giving a hundred or more blooms. Propagation is most easily effected by division of the roots in the autumn or spring, but seed may also be sown in the spring or early summer. Out of the numerous species and varieties we give a selection of the best below :—

Chrysanthemum coccineum (Syns. *Pyrethrum coccineum* and *P. roseum*). —This is an attractive scarlet sort blooming from June to September, and averaging about a yard high. From it are derived the handsome border plants described in our article on *Pyrethrum*.

C. grandiflorum.—A biennial or semi-perennial species, with yellow flowers produced in the summer. Height, 2–3 ft.

C. lacustre (MARSH OX-EYE DAISY).—This is an autumn blooming species similar to *C. maximum*, but requiring a moister situation.

C. Leucanthemum (OX-EYE DAISY).—This is well known, with its white flowers borne from June to early August. Its height is 2 ft.

C. maximum (OX-EYE or SHASTA DAISY).—This is the species most frequently cultivated, and of which there are now numerous varieties, such as *King Edward VII.*, *Mrs C. Lothian Bell*, *Mrs Head*, *Prince Henry*, *Maurice Pritchard*, *Snowdon*, *The Speaker*, *Rev. H. Sanders*, *Mrs J. Tersteeg*, etc. The size of the flower varies greatly. The old *Dr Hogg*, for instance, had flowers 1½–2 ins. across, but the blooms of *Maurice Pritchard* are often 4 ins. across and sometimes more. The flowering period of the varieties of this species is a long one, extending from June to late October, while the height varies from 2 ft. to 1½ yds.

C. uliginosum (Syn. *Pyrethrum ulginosum*).—This, the GRAND OX-EYE DAISY, is an autumn blooming species with white flowers. Its height is 5–6 ft.

Rock Garden Species.—The above Perennial Border Species are too coarse for the rock garden. The two species described below are, however, well worth growing. They thrive in deep, well-drained soil, and are propagated by division of the roots in the autumn or spring.

Chrysanthemum alpinum.—This is a small tufted plant. Flowers white. Site sunny. Soil deep gritty. Flowering Period, June to July. Height, 4 ins.

C. arcticum.—This is similar to the above but larger. Flowers white, though tinged lilac. Site, half-shade. Soil deep gritty. Flowering Period, August to September. Height, 9 ins.

See also FEVERFEW in *MEDICINAL HERBS*, and *PYRETHRUM*.

CHRYSANTHEMUM MILDEW.—See *DISEASES OF PLANTS.*

CHRYSANTHEMUM RUST.—See *DISEASES OF PLANTS.*

CHRYSANTHEMUMS, CULTIVATION OF.—In the British Isles the Chrysanthemum, botanically termed *Chrysanthemum sinense*, has been aptly termed "The Queen of Autumn," and again, "The Autumn Queen" or "Autumn Glory." It is a general favourite, because it embraces so many types and varieties, and while it responds in a remarkable way to skill and attention in culture, yet is wonderfully patient of neglect, plants often flowering freely in autumn after weeks of inattention. Coming into bloom in the dull season when flowers are scarce, the handsome plants adorn the greenhouse for several weeks, providing a display unequalled by any other subject of cultivation.

Propagation.—This is carried out in winter and early spring by means of cuttings obtained from basal growths which emerge from the roots after the parent plant has grown to maturity. The cuttings strike root readily in a temperature of about 50° F., and in from six to eight weeks are ready to be transplanted. The greenhouse varieties, which flower in October, November, and December, are usually grown in pots throughout the season, so that after the cuttings have struck root they require to be potted on into larger-sized pots, continuing this process about every six weeks until the end of June, by which time the plants should be in 8-inch pots. They then need all the light and air possible, and an exposed situation in the garden should be chosen. Bamboo stakes should be inserted at the final potting, since the plants grow tall as a rule and need support.

During the month of July careful attention is necessary to provide a plentiful supply of water, and towards the end of the month a little stimulant may be added to the water. In August the flower-buds form, and, to secure early blooms, the side-growths which emerge from the base of the buds must be removed. As the flower-buds begin to swell up, manure water and weak soot water may be given with increasing frequency as time goes on. By the middle of September the greenhouse or conservatory should be in readiness to receive the plants. There is always much danger of harm from frost, and boisterous wind and heavy rain should be avoided at this stage. Any plants which are showing the colour of the petals must be housed in good time, but the later-flowering varieties, and Singles which flower on terminal sprays, may be left out for another week or two if the weather is open.

Groups or Types.—Chrysanthemums may be divided into two main groups: first, the outdoor or early-flowering varieties; and secondly, the indoor or late-flowering varieties.

OUTDOOR CHRYSANTHEMUMS have been improved to a wonderful degree within the last few years, and there is now a host of varieties of every hue, some flowering in early August, others in September, and quite a number in October; but these latter often require shelter to preserve them from rain and frost. In addition to the double-flowering outdoor varieties there are many charming single-flowering sorts which are useful for garden decoration, or as cut flowers. The Pompons are popular for outdoor culture, and nothing can excel them for hardiness, as they survive the worst weather, coming up with remarkable vigour every spring. The outdoor varieties are propagated in the same way as the indoor kinds, namely, from cuttings; but the plan more generally adopted is to divide up the old stools in March, selecting young growths with roots attached and throwing away the remainder. These young plants, put into well-prepared ground in a fairly open situation, will grow freely during the summer if given water occasionally in hot weather, and a mulching of short stable manure in July will assist in building up good blooms for a display in August or September, according to the variety.

INDOOR or LATE-FLOWERING varieties may be divided into several sections. Firstly, we have the large Double-flowering exhibition Chrysanthemum, generally called the "Japanese"; some have incurving petals, others with the petals reflexed. Secondly, there is a numerous class known as Decorative varieties, similar in many respects to the exhibition Japanese, but more adapted for yielding a quantity of medium-sized flowers rather than two or three monster blooms on a plant. The Incurved varieties are largely grown for their shapely blooms, the petals all curving in to the centre, so that it is the back of the petals which is visible. Then there is the Single-flowering type, which is now very popular and bids fair to outrival all the other kinds for lightness and graceful decorative effect. Large single blooms may be obtained with a diameter of from 6–7 ins. by disbudding, medium-sized blooms by thinning other varieties moderately; while yet there are some varieties which must be allowed to grow quite naturally, the result being that they form a bush covered with sprays of small star-shaped blooms. The single form of the Chrysanthemum yields nothing to the double types in variety of colouring, while many of the varieties are sweet-scented, the perfume reminding one somewhat of honey. The Pompons and Anemone Pompons are delightful in every way, and are worthy of inclusion in any collection. Then there is a type which finds favour with those who are fond of quaintness—the feathery, spidery, and thread-petalled varieties.

When all of the types are represented in a large collection the effect is wonderful.

To Get New Sorts.—New varieties are obtained by sowing seeds saved from plants which have been properly cross fertilised with other varieties. Seeds sown in February in a genial temperature in the greenhouse will flower the same season in November, so that the raiser has not long to wait to see the result of his attempt to add to the list of varieties. If the novelty thus raised finds favour, the raiser, of course, has the privilege of naming it. The "singles" are very easy to propagate from seed; so much so, that many nurserymen offer packets of seed every winter at low prices. Of course in these packets the seeds are not likely to produce valuable novelties, although occasionally such is the case, and the grower finds it worth while to perpetuate a promising plant.

New varieties are also obtained by means of "sports"; that is, a plant occasionally develops a different coloured flower on one stem to those on the remainder of the plant. Cuttings are obtained from the sportive stem, and the new colour is thus perpetuated under another name. A variety named *Caprice du Printemps* has yielded quite a number of "sports" in this way, and they are designated *Bronze Cap*, *Red Cap*, *White Cap*, etc.

The Chrysanthemum has many enemies, which, if allowed to carry on their ravages unchecked, will rob the grower of all prospect of success. In the early stages the green fly and the leaf miner are the worst enemies. For methods of dealing with these pests, see article on *INSECT PESTS*.

The Chrysanthemum is heir to two very insidious diseases in summer, which, if not taken in time, are very dangerous to the life of the plant. "Fungus," which attacks the underside of the lower leaves, assumes the form of rusty-brown rings, which increase and spread until the foliage goes off entirely as if it had been scorched by fire. "Rust" is another disease, which is very similar in character to "Fungus," but is caused by overcrowding chiefly, whereas the other disease will appear in the best regulated garden, where everything is done to ensure the good health of the Chrysanthemum plants.

[Mildew is also troublesome, especially in the earlier stages of growth.—EDITOR.]

For preventative measures, see article dealing with *DISEASES OF PLANTS*.

It will be seen from the above brief description of the Chrysanthemum that the culture has vast possibilities for the beginner, and the enthusiastic amateur is always welcomed into the ranks of Chrysanthemum growers.

Selection of Sorts.—The varieties now in cultivation are almost legion, owing to propagation from seed offering so little difficulty, and also to the fact that the Royal Horticultural Society and the National Chrysanthemum Society both offer inducement to raisers of useful novelties. The beginner is positively bewildered at first blush to know what to start with, but the specialists who offer plants for sale will as a rule give advice willingly on the subject of forming a collection of varieties of easy culture for an initial start. The autumn flower-shows, both local and central, are very educational, as all the choicest varieties are there seen at their best. Lists, if given here, would be of very little use, as varieties become so quickly out of date. Hence readers are referred to raisers or Chrysanthemum specialists.—JAS. C.

CHRYSANTHEMUMS, Historical Notes on.—This popular autumn flower has been grown from time immemorial. The beautiful exhibition and garden varieties are the result of long ages of cultivation, cross fertilisation, and selection by Oriental gardeners, who from *C. sinense* succeeded in obtaining those varieties first introduced into Europe towards the close of the eighteenth and beginning of the nineteenth centuries.

Confucius, five hundred years before Christ, mentioned the flower, and many of the great classical poets of that country have referred to it in their works. Tu Fu, Po Chü-i, Ssü-K'ung T'u, eminent writers of more than a thousand years ago, speak of the Chrysanthemum in terms of high appreciation; while T'ao-Yuan-Ming, an eminent cultivator of Chrysanthemums who lived 365–427 A.D., has remained famous to this day for the success he achieved in their culture.

The flower at an early period of its existence passed over to the Isles of Japan. There it became as great a favourite as in the country of its origin. About the year 900 A.D. the Emperor Uda inaugurated the first of the Imperial Chrysanthemum Garden-parties, which have continued to be held to this day. The Chrysanthemum has also been adopted as the emblem of the highest Order of Chivalry in that country, and is rarely bestowed upon any but royal personages.

Although known in some form or other and under various names to the old European botanists, the Chrysanthemum was not introduced into Europe till 1789, when Pierre Louis Blancard of Marseilles brought from Macao the first variety (long called "the old purple") cultivated in western gardens. It was subsequently sent to Kew, and flowered for the first time in England at Colvill's Nursery, Chelsea, and was figured in the *Botanical Magazine* in 1796, see tab. 327.

Through private enterprise and the exertions of the Horticultural Society of London many new sorts were imported from the Far East, until Captain Bernet, a retired French officer, found in 1827 that the plant could be seeded in France. From that time forward many novelties were raised from seed by European growers.

The small flowering Pompon varieties are the descendants of *C. indicum*, and were the result of the introduction by Mr R. Fortune, shortly after the China War of 1842, of a variety called the CHUSAN DAISY; it is also to that intrepid botanical traveller that we owe the introduction on his second visit to the Far East twenty years later of the ever-popular Japanese varieties.

Chrysanthemum shows began to be held throughout the United Kingdom in the early "forties" of the last century, and many societies for encouraging the culture of the flower were started. To-day their number is legion, the National Chrysanthemum Society being the oldest and most influential of them all.

Early-flowering varieties were at first solely confined to the Pompon section, and appeared about the year 1850. A quarter of a century ago M. Simon Délaux of Toulouse, and other Continental raisers, brought into notice the charming free-flowering early-border varieties of Japanese form now so generally admired.

One of the most famous English growers to bring the Chrysanthemum forward in its infancy was John Salter, who was called "the father of the Chrysanthemum." Ernest Calvat was probably the most famous of the French raisers. In the United States Dr Walcott, John Thorpe, and others helped the good work along on that side of the globe; while Australia, with T. W. Pockett successfully employing his energies in raising novelties, has acquired a renown that will long remain a bright page in the annals of this far-famed flower.—C. H. P.

CHRYSEIS.—A synonym for *ESCHSCHOLZIA*, which see.

CHRYSIS.—See *ORCHIDS*.

CHRYSOGONUM (GOLDEN KNEE. Nat. Ord. Compositæ).—This is a little known hardy perennial plant not unlike the sunflower (*Helianthus*). It is useful for a shady position in the border where the collection is somewhat extensive. Plant it in March in ordinary good rich humic soil and propagate it by division of the roots or by seeds sown in the usual way in the spring.

What to Grow.—Only one species has so far come to our knowledge as being of value as a garden plant. This (*Chrysogonum virginianum*) produces yellow flowers in May and June, and averages just over 12 ins. in height.

CHRYSOPSIS (Nat. Ord. Compositæ).—This is more suitable for the wild garden than for the hardy perennial border, though it may be included in the latter. Its Daisy-like flowers make it attractive in the eyes of some, though we must confess that there are many better things. Regarding soil it is not particular; being of a strong constitution it might be more often grown in town gardens than it is, in sites where more valuable things fail. It may be propagated by splitting up the rootstocks in the usual manner in the early spring, and may be planted from November to March.

What to Grow.—In our opinion *Chrysopsis trichophylla* is one of the best of the sorts now known. This produces yellow flowers about midsummer, and averages some 12 ins. in height. *C. villosa Rutteri* is preferred by some people. It resembles *C. trichophylla* in its characters.

CHRYSOSTEMMA.—Now included in the genus *COREOPSIS*.

CHUSAN DAISY.—See *CHRYSANTHEMUMS: HISTORICAL NOTES ON*.

CICHORIUM (CHICORY. Nat. Ord. Compositæ).—This is an important genus of hardy biennial and perennial vegetables and saladings. The two best known species are *C. Endivia*, on which a separate article named *ENDIVE* appears, and *C. intybus*, the common CHICORY, dealt with in our notes on *SALAD PLANTS*, and in other articles.

See also under CHICORY in *MEDICINAL HERBS* and *SALAD PLANTS*.

CICUTA.—See *WATER HEMLOCK*.

CILIARIA.—Now included in the genus *SAXIFRAGA*.

CILIATED PINK (*Dianthus ciliatus*).—See *DIANTHUS*.

CILICIAN FIR (*Abies cilicica*).—See *TREES*.

CIMICIFUGA (Nat. Ord. Ranunculaceæ).—Many fanciful names, such as Bugbane, Bugwort, Snakeroot, and so forth, have been applied to this genus, but none are sufficiently well fixed to warrant us treating it under its English name. We have already described the genus *ACTAEA* which is somewhat similar to this, and indeed *Cimicifuga foetida* is by some botanists known as *Actaea cimicifuga*.

Culture.—This is easy. The plant succeeds well in the half-shady borders in or out of the wild garden where the soil can be kept somewhat damp. It is easy to increase by seeds sown in the usual way in the spring or summer, and may also be increased by splitting up the old roots in the spring, which is the most suitable time to plant.

What to Grow.—The following may be included if space permits :—

Cimicifuga americana.—A white or yellow sort blooming in July and August, and averaging just under a yard in height.

C. cordifolia.—Similar to the above in colour and height but blooming earlier (from midsummer onwards).

C. dahurica (or *C. davurica* of some botanists and nurserymen).—This is a white sort coming out during July. Its height is about 2 ft.

C. foetida.—As remarked above by some, this is known as *Actaea cimicifuga*. Its flowers are a yellowish-white and are produced from midsummer onwards. The average height of the plant is about a yard.

C. japonica.—A white variety blooming in July and August, averaging 3 ft. in height.

C. racemosa.—This is also a white flowered sort. It blooms in July, and averages rather more than 3 ft. in height.

CINERARIA (Nat. Ord. Compositæ).—This is a genus of greenhouse herbaceous perennials and shrubs about 18–24 ins. in height—very favourite greenhouse plants, and offering a wide range of floral colour. They are easily grown from seed, and flourish in a compost of turfy loam and decayed manure, two parts each, leaf-mould one part, and enough sharp sand or charcoal chips to keep the whole sweet and open. Propagation is usually best effected by seed, though cuttings may be taken and struck in the same manner as for *PELARGONIUMS*, which see.

Culture.—Sow the seed from April to June at intervals of a few weeks to secure successional plants, thereby extending the flowering season. Prick out the seedlings when large enough to handle and place them in "thumbs," repotting into a larger size before the roots begin to bind. Eight-inch pots will be quite large enough for the biggest specimen plants to bloom in. Cool treatment in a frost-proof house, abundant ventilation, and occasional fumigation against aphis (see article on *FUMIGATING*) will ensure success.

USES.—These plants supply greenhouse blooms when flowers are scarce. The earliest batch will come into bloom before Christmas-time, and a good show can be kept up till well on in the spring.

Varieties.—As the colours come almost true from seed, a selection can be made from high-class strains offered by several prominent seed houses.—J. L. G.

[All the hardy herbaceous perennial species of Cineraria of any importance are now included in the genus *SENECIO*, on which we devote a separate article.—EDITOR.]

UP-TO-DATE SELECTIONS.

Cineraria Large-Flowered Rainbow.—Pink, blue, etc.

C. Prize.—Many colours.

C. Superb.—Many colours.

CINNA.—Now included in the genus *MUEHLENBERGIA*.

CINQUEFOIL.—A name applied by some to *POTENTILLA*, which see. See also POTENTILLA in *SHRUBS*.

CIRCAEA (Nat. Ord. Onagraceæ). This is a genus of weedy plants of no garden value, though sometimes offered in lists. *C. lutetiana* is the best known and most troublesome. It is described under its English name, ENCHANTER'S NIGHTSHADE, in our article on *WEEDS*.

CIRCASSIAN CHERRIES. — See *CHERRIES: OUTDOOR CULTURE.*

CIRCULAR BEDS, AREA OF.—See AREAS OF BEDS AND BORDERS in *ARITHMETIC AND GARDENING.*

CIRROPETALUM.—See *ORCHIDS.*

CIRSIUM.—Now included in the genus *CNICUS.*

CISTERNS.—See *TANKS AND CISTERNS.*

CISTUS.—Now correctly included in the genus *HELIANTHEMUM.* See also *CLIMBING AND TRAILING PLANTS* and *SHRUBS.*

CITRIC ACID.—See *ACIDS.*

CITY GARDENING.—See *TOWN AND CITY GARDENING.*

CITY GARDENS, ANNUALS FOR.—See *TOWN AND CITY GARDENING.*

CLADRASTIS.—For the best species see *TREES.*

CLARKIA (Nat. Ord. Onagraceæ). This genus is a small one so far as number of species is concerned, but large as regards popularity and cultivated varieties. Three species are in cultivation, all from Western North America, but there are also two Californian species not yet grown in gardens. The former, briefly described below, are hardy annuals suitable alike for the flower garden and for pot culture in conservatory decoration. At the great International Show at Chelsea, and at subsequent May shows of the Royal Horticultural Society, Clarkias have invariably produced a most effective display in seedsmen's exhibits, and such plants 2½–4 ft. high, elegant and freely flowered, are produced from an autumn sowing and by frame and greenhouse treatment. For early flowering a sowing outside in early September is advisable, but if the soil and situation are cold, the protection of a cold frame will prevent losses from slugs and from the excessive damp of our winters. The plants should be transferred to their flowering quarters in the early spring. From an April sowing outdoors or in a frame in March, a successional batch of plants to flower in late summer may be raised quite easily. Thorough thinning is desirable, and if the leading growth is pinched out a bushy plant will result. The best-named sorts are far better than mixtures, and by a careful arrangement of colours a border may be filled handsomely with Clarkias.

We here describe the three species as already promised:—

C. elegans (Syns. *C. integripetala* and *C. unguiculata* of gardens). —This bears crimson-lake coloured flowers throughout the summer, and averages 2 ft. high. Beautiful varieties are:—*Delicate Pink* (double soft pink); *Firefly* (double rosy-crimson); *Purple Prince* (double ruby-purple); *Salmon* (both double and single forms are available of this bright salmon-scarlet sort); and *Snowball* (double white).

C. pulchella (Syns. *C. elegans* (of Poir) and *C. pulcherrima*).—This is of dwarfer habit than the *C. elegans* varieties. The colour range in the flowers of modern varieties is from white to deep rose-purple; the type colour is purple. There are both double and single varieties, each eminently suitable for massing in flower borders, as the blooming period extends throughout the summer. *Brilliant Rose* (rich rose) and *Marginata* (rose, edged with white—double and single) are fine named varieties.

C. rhomboidea (Syn. *C. gauroides*). —This pink, summer flowering sort bears smaller and less attractive flowers than those of the preceding species and varieties. Its height averages 1½ ft.

CLARY (*Salvia Sclarea*).—See *POT-HERBS* and *SALVIA*.

CLASSES OF MANURES.—See *MANURES*.

CLASSIFICATION OF DAFFODILS.—See *DAFFODILS*.

CLAY.—See *SOILS: THEIR ORIGIN AND NATURE*.

CLAY COLOURED WEEVIL.—See under OTIORHYNCHUS WEEVILS in *INSECT PESTS*.

CLAY SOILS, IMPROVING.—See *SOIL IMPROVEMENTS*.

CLEANING BULBS.—See *BULBS: CLEANING AND STORING*.

CLEMATIS.—For the best species see *CLIMBING AND TRAILING PLANTS*.

CLERODENDRON.—For the best species see *SHRUBS*.

CLETHRA.—For the best species see *SHRUBS*.

CLIANTHUS (GLORY PEA. Nat. Ord. Leguminosæ).—This is an evergreen shrub which does well in pots, or planted out in a conservatory against a wall. It is propagated by cuttings in sandy soil under frame or hand-light, also by seed sown in spring. It thrives in a soil of good fibrous loam, peat, and sand. Temperature required, 40–50° F.

Greenhouse Species and Varieties:—*Clianthus Dampieri.*—Red. Flowers in March. Height, 1–2 ft.

C. puniceus.—Crimson. Flowers from May to September. Height, 2–6 ft.

C. p. albus.—White. Flowers from May to September. Height, 2–6 ft.

C. p. magnificus.—Reddish-crimson. Flowers from May to September. Height, 2–6 ft.

See also *CLIMBING AND TRAILING PLANTS*.

CLICK BEETLES.—See WIREWORMS in *INSECT PESTS*.

CLIMBERS FOR CITY GARDENS.—See under TREES AND CLIMBERS in *TOWN AND CITY GARDENING*.

CLIMBERS FOR NORTH BORDERS. See *NORTH BORDERS: SOME PLANTS FOR*.

CLIMBERS, TRAINING OF.—See *TRAINING OF PLANTS*.

CLIMBING AND TRAILING PLANTS.—In the decoration of the flower garden and in other parts of the grounds the value of plants which are of climbing or trailing habit is undeniable. Without their aid the average garden looks tame and unsatisfying; thus their judicious use cannot be too strongly advocated. It is unnecessary to dilate upon their beauty and the purposes to which they may be applied.

To cover bare walls, to clamber up poles or over rough shrubs and trees, to ramble over a trellis or arch, are only some among the many uses to which they can be put, and their proper planting and cultivation deserve greater consideration from the gardener than has hitherto been given in many places.

The term "Climbing and Trailing Plants" is an elastic one in horticulture, and has been extended to include many shrubs not naturally climbers or trailers, which are valuable for covering walls, etc., or are more satisfactory in our climate when given the protection these afford. It is impossible to give a full list of the latter here, but an endeavour has been made to select from the great number available some of the best and more useful. In this list there will be found plants of many kinds, some of twining habit, others which require to be fastened to the structure they are to adorn, and some which look best when hanging over a wall or trailing down a bank or slope in the rock garden. Some are of annual and others of perennial habit. A proportion are evergreen, but many are deciduous.

General Culture.—Brief notes are given below of the treatment specially required by each class, but some general principles of cultivation refer to all, and it will save space if these are discussed together.

The preparation of the soil for climbing or trailing plants is of the highest importance. It is self-evident that subjects which make so much top-growth call for good nourishment in the ground, and this should be provided by careful preparation. It is well-nigh impossible to err in this direction, except in the case of tender shrubs, which should not be encouraged to make too strong growths.

The soil should be well prepared by trenching and the addition of plenty of thoroughly well-rotted animal manure if this can be procured at all. Some ground bones may be added to maintain the fertility of the soil. Where only artificial manure is available, this should be given in the usual proportion for other subjects. The holes made for the reception of the plants should be at least 3 ft. across, and no pains should be spared to secure a good soil as a medium for the plants. This may consist of sound, fertile loam; if too heavy, it may be lightened by the addition of some leaf-soil or peat.

In almost every case the situation should be a sunny one, although some climbers will thrive in shaded or partially shaded positions. Ivy (*Hedera*) may be cited as an example of the latter. The situation, however, depends greatly upon the walls or other places the climbers are intended to cover.

Planting.—Many climbers can be procured from the nurseries in pots, and it is certainly preferable to obtain them thus for the convenience of planting so as to disturb the roots as little as possible. When ready to plant they should be turned carefully out of the pots. If these are filled with roots, those on the outside of the ball may be carefully put in position at the proper depth. Plants grafted or budded about the ground-level should be planted a little deeper than before.

Pruning.—Little pruning or trimming is generally needed with annuals, although some, such as the Tropacolums of the *lobbianum* and similar types are improved by having some of the leaves removed in order to allow the flowers to be better seen. Notice should be taken as to whether they flower on the old or ripened wood or on the new growths. In the former case pruning should be confined to taking away superfluous shoots and removing decayed or weak wood. In the latter some of the old growths should be cut away, and the production of new branches encouraged.

As a general rule shrubs which flower in spring should be pruned immediately flowering is over, and autumn flowering subjects in winter or spring.

Training.—While unnatural stiffness should be avoided, it is essential to see that the plants are properly trained that they may show their beauties to the best advantage, and are neatly fastened to the wall or other support. Unless this is done in good time the effect will be greatly reduced and an air of untidiness and want of care will be apparent. Plants on walls may either be nailed, or, better still, tied to wires fixed for the purpose of training as in the case of fruit trees.

Annual Climbers.—These may be divided into two classes, hardy and half-hardy.

HARDY.—All the members of this section should be sown where they are to bloom, giving the soil thorough preparation by deep digging and manuring. The seeds must be sown very thinly, and, if necessary, the seedlings thinned out 9–12 ins. apart according to the vigour of the subject. It is not always convenient to sow the seeds where the plants are to bloom, and in this case they may be sown under glass, and the seedlings treated in the same way as half-hardy annuals, for which see separate article on *ANNUALS FOR ALL PURPOSES*, and paragraph below.

HALF-HARDY.—Those belonging to this section should be sown in slight heat in spring at the usual time for half-hardy annuals, and only require the general treatment recommended for them. They can be planted out in late May or the beginning of June. It is generally more satisfactory to put the young plants singly into small pots after the first pricking off, and if the pots become filled with roots before the time for planting out, to shift them into larger ones and to plant with the ball intact.

Perennial Climbers.—These likewise may be divided into hardy and half-hardy sorts. They are generally propagated by seeds, cuttings, or layers. As propagation by these methods is treated of elsewhere in this work (see article on *PROPAGATION OF PLANTS*), it is unnecessary to give details here.

HARDY.—These are usually of easy culture, but it is necessary for their well-being that they should be liberally nourished both by proper preparation of the soil before planting and when they are growing strongly. Established plants are greatly helped by giving them occasional supplies of weak manure water, and, in dry weather, also by complete soakings with pure water at intervals. They are greatly benefited, too, by the annual removal of a little of the surface soil and replacing it with fresh compost together with a mulch of animal manure where this would not be offensive, or dressings of an artificial fertiliser. Training and pruning must be carefully attended to at the proper seasons. See articles on *PRUNING ROSES AND SHRUBS*, and *TRAINING OF PLANTS*.

HALF-HARDY.—Generally speaking, these require the same treatment as that for the hardy sorts. They must, however, be protected in the winter. A common error in doing this is to cover the plants too closely, with the result that premature growth is induced before the coverings are removed, and when they are taken off injury is frequently caused by spring frosts. Spruce and other coniferous branches are excellent for covering them, and scrim or comparatively open mats are better than close canvas or sacking.

Shrubby Climbers.—Many plants not properly of climbing habit are employed for covering walls or trellises, and it is advisable to give a selection of these. They may be divided into Hardy Deciduous, Half-Hardy Deciduous, Hardy Evergreen, and Half-Hardy Evergreen plants. The treatment advocated above applies to them also. It must be noted that the division into hardy and half-hardy plants is somewhat arbitrary, as plants hardy in some localities may be only half-hardy in others, and *vice versa*.

What to Grow.—In the following selection only some of the best sorts are named, and in some genera the number of species and varieties is so great that they cannot be fully enumerated; hence readers are referred to the lists of the leading nurserymen.

In the different sections, shown by the initials inserted in brackets, *H.A.* stands for Hardy Annual; *H.H.A.* for Half-Hardy Annual; *H.D.* for Hardy Deciduous Perennial; and *H.H.D.* for Half-Hardy Deciduous Perennial; *H.E.* for Hardy Evergreen; and *H.H.E.* for Half-Hardy Evergreen.

Abelia chinensis (*H.H.E.*).—The ROCK ABELIA, with pink flowers in September. Height, 5 ft.

A. floribunda (*H.H.E.*). — The FLORIFEROUS ABELIA, with pink flowers in September. Height, 4 ft.

Abutilon megapotamicum (Syn. *A. vexillarium*, *H.H.D.*).—The BIG RIVER ABUTILON, with scarlet and yellow flowers from June to August. Height, 5 ft.

A. vitifolium (*H.H.D.*).—The VINE-LEAVED ABUTILON, with mauve flowers in August. Height, 12 ft.

Aconitum volubile (*H.D.*).—The CLIMBING MONKSHOOD, with blue flowers in August. Height, 9 ft.

Actinidia Kolomikta (*H.D.*).—White flowers in June. Height, 10 ft.

Akebia quinata (*H.D.*).—The FIVE-LEAFLETED AKEBIA, with purple-brown flowers in March. Height, 9 ft.

Ampelopsis. See *Vitis.*

Aristolochia Sipho (*H.D.*).—The DUTCHMAN'S PIPE, with yellowish and brown flowers in July. Height, 30 ft.

Atragene. See *Clematis.*

Azara Gilliesii (*H.E.*).—Yellow flowers from November onwards. Height, 15 ft.

A. microphylla (*H.E.*). — The SMALL-LEAVED AZARA, with greenish-yellow flowers in May. Height, 20 ft.

Berberidopsis corallina (*H.H.E.*).—The CORAL BARBERRY, with red flowers in June. Height, 20 ft.

Berberis. See article on *SHRUBS.*

Berchemia volubilis (*H.D.*).—The TWINING BERCHEMIA, with white flowers in June. Height, 15 ft.

Bignonia capreolata (*H.H.D.*).—The TENDRILLED TRUMPET FLOWER, with red and yellow flowers in April. Height, 15 ft. See also *Tecoma.*

Buddleia Colvillei (*H.H.E.*).—Rose flowers in July. Height, 20 ft.

B. globosa (*H.H.D.*).—The ORANGE BALL TREE, with orange flowers from May onwards. Height, 15 ft.

B. variabilis (*H.D.*).—The VARIABLE BUDDLEIA, with purple flowers in July. Height, 20 ft. Its variety *Veitchiana* bears purple-mauve flowers, but is otherwise similar.

Calystegia hederacea fl. pl. (Syn. *C. pubescens fl. pl.*, *H.D.*).—The DOUBLE BINDWEED, with rose flowers from June to August. Height, 6 ft.

Camellia japonica (*H.E.*).—The well-known CAMELLIA, with white to crimson flowers from March onwards. Height, 20 ft.

Carpentaria californica (*H.D.*).—The CALIFORNIAN CARPENTARIA, with white flowers in July. Height, 10 ft.

Ceanothus americanus (*H.D.*).—The NEW JERSEY TEA, with white flowers in June. Height, 8 ft.

C. azureus (*H.D.*).—The BLUE MOUNTAIN SWEET, with blue flowers in June. Height, 10 ft.

C. hybridus (*H.D.*).—The HYBRID MOUNTAIN SWEET, in many varieties from white to blue and red, flowering in June. Height, 10 ft.

Celastrus articulatus (*H.D.*).—The STAFF TREE, with pale yellow flowers in July followed by bright berries. Height, 10 ft.

C. scandens (*H.D.*).—The BITTER SWEET, with pale yellow flowers in July, succeeded by red and yellow berries. Height, 10 ft.

Chimonanthus fragrans (*H.D.*).—The WINTER SWEET, with yellowish flowers from December onwards. Height, 6 ft.

Choisya ternata (*H.E.*).— The

MEXICAN ORANGE FLOWER, with white flowers from June to September. Height, 8 ft.

Cistus (*H.D.* or *H.H.E.*).—ROCK ROSE. This is now correctly included in the genus *Helianthemum*; some of the better known species will be found in our article on *SHRUBS*.

Clematis alpina (Syn. *Atragene alpina*, *H.D.*). — The ALPINE CLEMATIS, with blue flowers in summer. Height, 10 ft.

C. coccinea (*H.D.*).—The SCARLET CLEMATIS, with scarlet flowers in summer. Height, 8 ft. Its variety *hybrida* is available in many colours, and blooms in July. Height, 8–10 ft.

C. Flammula (*H.D.*). — The FLAME CLEMATIS, with white flowers from July onwards. Height, 20 ft.

C. florida (*H.D.*).—The FLORID CLEMATIS, with white flowers in April. Height, 10 ft. Its variety *hybrida* is available in many double and single colours, but is otherwise similar. See nurserymen's catalogues for selection.

C. Jackmani (*H.D.*).—JACKMAN'S CLEMATIS, with purple flowers from August to October. Height, 20 ft. Its variety *hybrida* is available in many colours, as described in nurserymen's lists, but is otherwise similar.

C. lanuginosa (*H.D.*). — The WOOLLY CLEMATIS, with blue flowers from June to August. Height, 10 ft. Its variety *hybrida* is available in many colours, single and double, as described in trade lists, but is otherwise similar.

C. montana (*H.D.*).—The MOUNTAIN CLEMATIS, with white flowers in May. Height, 20 ft. Its varieties *grandiflora* and *rubens* bear white and rosy-purple flowers respectively, but are otherwise similar.

C. orientalis (*H.D.*).—The STRONG-SMELLING CLEMATIS, with yellowish-green flowers in summer. Height, 20 ft.

C. patens (*H.D.*).—The SPREADING CLEMATIS, with white flowers from June onwards. Height, 10 ft.

C. tangutica (Syn. *C. orientalis tangutica*, *H.D.*). — The BRIGHT YELLOW CLEMATIS, with golden-yellow flowers in July. Height, 10 ft.

C. Vitalba (*H.D.*).—The well-known OLD MAN'S BEARD or TRAVELLER'S JOY, with white flowers in July. Height, 20 ft.

C. Viticella (*H.D.*).—The VINE BOWER CLEMATIS, with blue or purple flowers from June onwards. Height, 20 ft. Its variety *hybrida* is available in many colour forms as described in nurserymen's lists, but is otherwise similar.

Clianthus puniceus (*H.E.*).—The GLORY PEA, with crimson flowers in July. Height, 5 ft.

Cobœa scandens (*H.H.A.*).—The CLIMBING COBÆA, with violet or white flowers in July. Height, 20 ft.

Cornus capitata (Syn. *Benthamia fragifera*, *H.H.E.*). — BENTHAM'S STRAWBERRY TREE with green and yellow flowers in June. Height, 10 ft.

Corylopsis spicata[1] (*H.D.*).—The SPIKED CORYLOPSIS, with yellowish flowers in February. Height, 15 ft.

Cotoneaster microphylla[1] (*H.E.*).—The SMALL-LEAVED ROCK SPRAY, with white flowers in June. Height, 10 ft.

Crataegus Pyracantha (*H.D.*). — The FIRE THORN, with scarlet berries in autumn. Height, 10 ft.

Cucumis. See articles on *CUCURBITA* and *PUMPKINS AND GOURDS*.

Cucurbita.—See separate article and article on *PUMPKINS AND GOURDS*.

---

[1] For other species see article on *SHRUBS*.—EDITOR.

Cydonia japonica[1] (Syn. *Pyrus japonica, H.D.*).—The JAPANESE QUINCE, with white to deep coloured flowers in April. Height, 8 ft.

Desfontainea spinosa (*H.E.*).—The SCARLET HOLLY, with scarlet and yellow flowers from June to August. Height, 6 ft.

Desmodium penduliflorum.—See *Lespedeza Sieboldi.*

Eccremocarpus scaber (Syn. *Calampelis scaber, H.A.*, or *H.H.D.*).—Orange-red flowers in summer. Height, 12 ft.

Elaeagnus pungens (*H.E.*).—The OLEASTER, NATSU, or NOTEN GUMI, mainly grown for its foliage, some variegated forms being pretty. Height, 6 ft. (See also article on *SHRUBS.*)

Embothrium coccineum (*H.H.E.*).—The FIRE BUSH, with scarlet flowers from April. Height, 5 ft.

Enkianthus japonicus[1] (*H.D.*).—White flowers in February. Height, 9 ft.

Ercilla volubilis (Syns. *E. spicata* and *Bridgesia spicata, H.E.*).—The CLIMBING ERCILLA, with purple flowers in June. Height, 10 ft.

Eucryphia cordifolia (*H.E.*).—The HEART-LEAVED EUCRYPHIA, with white flowers in August. Height, 15 ft.

E. pinnatifolia (*H.E.*).—White flowers in August. Height, 20 ft.

Euonymus americanus (*H.D.*).—The AMERICAN SPINDLE TREE, BURNING BUSH, or STRAWBERRY BUSH, with pretty foliage and crimson capsules in July. Height, 16 ft.

E. americanus angustifolius (*H.D.*).—The NARROW-LEAVED SPINDLE TREE, with pretty foliage and red capsules in autumn. Height, 15 ft.

E. europaeus (*H.D.*).—The SPINDLE TREE, with white flowers in June. Height, 15 ft.

E. japonicus (*H.E.*).—The JAPAN SPINDLE TREE, with ornamental leaves, some variegated forms being popular. Height, 6 ft.

Forsythia intermedia (*H.D.*).—The GOLDEN BELL, with yellow flowers in March. Height, 8 ft.

F. suspensa (*H.D.*).—The DROOPING GOLDEN BELL, with yellow flowers in March. Height, 8 ft. Its variety *Fortunei* should also be grown.

F. viridissima (*H.D.*).—Greenish-yellow flowers in March. Height, 8 ft.

Fremontia californica (*H.H.D.*).—Yellow flowers in April. Height, 6 ft.

Fuchsia (*H.D.*). See separate article on *FUCHSIA.*

Garrya elliptica (*H.E.*).—The well-known GARRYA, with greenish-white or yellow flowers in March. Height, 8 ft.

Hedera Helix (*H.E.*).—The well-known ENGLISH IVY, useful as a climber or covering plant. The best varieties are *algeriensis, amurensis angularis, atropurpurea, caenwoodiana, canariensis* (this is the IRISH IVY), *cinerea, conglomerata* (only suitable for very low walls), *dentata, digitata, rhombea, roegneriana,* and *sagittaefolia.* Variegated forms of most of these and numerous other varieties are described in trade lists, to which readers are referred.

Humulus Lupulus (*H.D.*).—The COMMON HOP. See article on *HUMULUS.* Height, 10 ft.

Hydrangea petiolaris (*H.D.*).—White flowers in April. Height, 20 ft.

Ipomoea Bona-nox (*H.H.A.*).—The MOON FLOWER, with white flowers from June to August. Height, 12 ft.

I. hederacea (*H.H.A.*).—The IVY-

---

[1] For other species see article on *SHRUBS.*—EDITOR.

LIKE MORNING GLORY, with blue and other coloured flowers from June to August. Height, 10 ft.

I. purpurea (Syn. *Convolvulus major*, *H.A.*).—The MORNING GLORY, with white to purple-coloured flowers from July onwards. Height, 10 ft.

I. quamoclit (*H.H.A.*).—The CYPRESS VINE, with various coloured flowers from July. Height, 10 ft.

Jasminum nudiflorum (*H.D.*).—The WINTER JASMINE, with yellow flowers in February and spring. Height, 10 ft.

J. officinale (*H.D.*).—The well-known JESSAMINE, with white flowers in June. Height, 10 ft.

J. revolutum (*H.E.*).—Yellow flowers in May. Height, 10 ft.

Kerria japonica (Syn. *Corchorus japonicus*, *H.D.*).—Yellow flowers in March. Height, 10 ft. Its variety *flore pleno* has double yellow flowers, but is otherwise similar.

Lathyrus grandiflorus (*H.D.*).—The LARGE-FLOWERED EVERLASTING PEA, with flowers of purple and other shades in June and August. Height, 8 ft.

L. latifolius (*H.D.*).—The BROAD-LEAVED or COMMON EVERLASTING PEA, with rose to white flowers in July. Height, 8 ft.

L. odoratus (*H.A.*).—The SWEET PEA, with flowers of many colours throughout the summer. Height, 10 ft. (See separate article on *SWEET PEAS*.)

Lespedeza Sieboldi (Syn. *Desmodium penduliflorum*, *H.H.D.*).—Red-purple flowers in July. Height, 8 ft.

Lonicera etrusca (*H.D.*).—The ETRUSCAN HONEYSUCKLE, with purple and yellow flowers from June to August. Height, 10 ft.

L. japonica (Syn. *L. halleana*, *H.D.*).—The JAPAN HONEYSUCKLE, with white flowers changing to yellow in June and July. Height, 10 ft. Its variety *aureo-reticulata* has variegated leaves, while *L. j. flexuosa* has purplish-yellow flowers, but is otherwise similar.

L. Periclymenum (*H.D.*).—The HONEYSUCKLE or WOODBINE, with red and yellow flowers in July. Height, 10 ft. The late Dutch variety blooms in autumn. Height, 15 ft.

L. Standishii (*H.D.*).—STANDISH'S HONEYSUCKLE, with fragrant white flowers in January and February. Height, 5 ft.

Lycium barbarum (*H.D.*).—The BOX THORN, with purple or violet flowers in May and June. Height, 12 ft.

Magnolia conspicua (*H.D.*).—The SHOWY LILY TREE or YULAN, with white flowers in April or May. Height, 20 ft.

M. grandiflora (*H.E.*).—The BULL BAY or LARGE-FLOWERED LILY TREE, with white flowers from June to July. Height, 30 ft.

M. tripetala (*H.D.*).—The UMBRELLA TREE or ELK-WOOD, with white flowers from June to July. Height, 30 ft.

Maurandya barclayana (*H.H.D.*).—Purple flowers from July to September. Height, 10 ft.

Menispermum canadense (*H.D.*).—The CANADA MOONSEED or MOONSEED, with greenish-white flowers in June and July. Height, 6–12 ft.

Mitraria coccinea (*H.H.E.*).—The MITRE FLOWER, with scarlet flowers in June and July. Height, 5 ft.

Muehlenbeckia complexa (*H.E.*).—The EMBRACING MUEHLENBECKIA, grown for its pleasing foliage. Height, 8 ft.

Mutisia decurrens (*H.D.*).—The RUNNING MUTISIA, with orange flowers in July. Height, 10 ft.

Myrtus Luma (*H.E.*).—White flowers from June to August. Height, 9 ft.

Olearia Haastii (*H.E.*).—HAAST'S

Daisy Bush, with white flowers in August. Height, 8 ft.

O. stellulata (*H.H.E.*). — The Starry Daisy Bush, with white flowers in August. Height, 4–6 ft.

Osmanthus Aquifolium (*H.E.*).— The Holly-leaved Osmanthus, with white flowers in August. Height, 4-6 ft.

Ozothamnus rosmarinifolius (*H.H. D.*). — White flowers from May onwards. Height, 8 ft.

Passiflora coerulea (*H.H.D.*).—The Passion Flower, with blue flowers from June to August. Height, 30 ft.

P. coerulea Constance Elliot (*H.H. D.*).—The White Passion Flower, with white flowers from June to August. Height, 30 ft.

Periploca graeca (*H.D.*).—The Silk Vine, with brownish-red flowers in June. Height, 10 ft.

Philadelphus (*H.D.*).—The well-known Mock Orange. See nurserymen's catalogues for countless species and varieties.

Pittosporum Tobira (*H.E.*). — White flowers in March. Height, 12 ft.

Polygonum baldschuanicum (*H.D.*). —Rose flowers in August and September. Height, 20 ft.

P. multiflorum (*H.D.*). — White flowers in August and September. Height, 20 ft.

Punica granatum (*H.D.*).—The Pomegranate, with red flowers from June to September. Height, 15–30 ft.

Raphiolepis japonica (Syn. *R. ovata, H.E.*).—White flowers in June. Height. 20 ft.

Ribes speciosum (Syn. *R. fuchsioides, H.E.*). — The Californian Fuchsia Currant, with deep red flowers in June. Height, 8 ft.

Rosa.—See separate articles on *Roses for All Purposes*, etc.

Rubus fruticosus fl. pl. (*H.D.*).— The Double Bramble, with white or pink flowers in July. Height, 12 ft.

Schizophragma hydrangeoides (*H.D.*). — The Climbing Hydrangea, with white or rose flowers in August. Height, 20 ft.

Smilax aspera (*H.E.*). — The Prickly Ivy or Rough Bindweed, with pleasing foliage but insignificant flowers. Height, 5 ft.

Solanum crispum (*H.D.*).—The Potato Tree, with blue-purple flowers from July. Height, 15 ft.

S. jasminoides (*H.D.*). — The Jessamine Potato Tree, with white flowers from July onwards. Height, 12 ft.

Stauntonia latifolia (*H.E.*). — Fragrant greenish-yellow flowers in April. Height, 9 ft.

Stuartia pentagyna (Syn. *Malachodendron ovatum, H.D.*).—The best known Stuartia, with white flowers in May. Height, 10 ft.

Tecoma grandiflora (*H.D.*).—The Large Trumpet Flower, with orange-scarlet flowers from June to August. Height, 20 ft.

T. radicans (Syn. *Bignonia radicans H.D.*). — The Trumpet Flower, with scarlet and orange flowers from June to August. Height, 30 ft.

Thunbergia alata (*H.H.A.*).—The Climbing Thunbergia, with various flowers from June to August. Height, 6 ft.

Tropaeolum aduncum (Syn. *T. peregrinum, H.H.A.*). — The well-known Canary Creeper, with yellow flowers throughout the summer. Height, 10 ft.

T. lobbianum (*H.H.A.*).—Lobb's Nasturtium, with cream to crimson coloured flowers from June onwards. Height, 10 ft.

T. majus (*H.A.*). — The well-known Climbing Nasturtium, with various coloured flowers from June to October. Height, 12 ft.

T. polyphyllum (*H.D.*).—Yellow flowers in June. A trailing plant. Height, 3–4 ft.

T. speciosum (*H.H.E.*). — The

favourite FLAME FLOWER or FLAME NASTURTIUM, with scarlet flowers from June onwards. Height, 6–10 ft.

Vitis (VINE).—The following plants (selected from many species) are grown for their highly ornamental foliage, which generally colours beautifully in the autumn. *V. heterophylla*, however, is prized for its bunches of blue fruits speckled with black in autumn. These Vines have inconspicuous flowers, and unless otherwise indicated are Hardy Deciduous Climbers. The heights given are only approximate. For edible fruiting sorts see article on *VINE*.

V. armata.—This is a handsome sort with large leaves, which assume a fine colour in autumn. The variety *Veitchii* which must not be confused with *Ampelopsis Veitchii* of gardens, for which see *Vitis inconstans*, is especially fine. Height about 20 ft.

V. capreolata (Syn. *Vitis hederacea*).—This is a good climbing vine with pretty five-foliate leaves. It has small black fruit about the size of a currant. Height, 20 ft.

V. Coignetiae (Syn. *V. congesta*).—This is of high ornamental value both in summer and autumn. It has large leaves of beautiful form and colour. Height, 30 ft. or more.

V. congesta.—Syn. *V. Coignetiae*, which see.

V. davidiana.—Syn. *V. heterophylla*, which see.

V. ficifolia Sieboldii.—Syn. *V. Thunbergii*, which see.

V. hederacea.—Syn. *V. capreolata*, which see.

V. henryana.—This is one of the newer ornamental vines. It has deep green velvety leaves with a white mid-rib, and the latter shows well against the crimson colouring of the rest of the leaf in autumn. Height, 20 ft.

V. heterophylla (Syns. *Ampelopsis aconitifolia*, *A. heterophylla*, *Vitis davidiana*, and *V. elegans*).—This is a vigorous climbing plant with palmately lobed leaves and inedible violet fruit. The variety *dissecta* has finely divided leaves. The form called *humulifolia*, known as the TURQUOISE BERRIED VINE, has handsome leaves and pale china blue fruit. The variety *variegata* has pretty variegated leaves. Height, 10–20 ft.

V. inconstans (Syns. *Ampelopsis tricuspidata*, *A. Veitchii*, *Vitis Roylei*, and *V. Veitchii*).—This is VEITCH'S VIRGINIA CREEPER, a rapid growing hardy climber of much beauty which assumes a brilliant colour in the autumn. The variety *Lowii* has small leaves and is a good coloured one. Height, 30 ft.

V. Labrusca.—The FOX GRAPE, NORTHERN FOX GRAPE, or SKUNK GRAPE, a rapid-growing hardy Vine with rounded cordate leaves and large dark purple or amber-coloured fruit. Height, 12 ft.

V. leeoides.—This is a fine Vine with leaves which are glossy green above and deep claret underneath. Height, 12 ft.

V. megalophylla.—A plant with very large leaves which are deep green on the upper and light glaucous green on the under surface. Height, 12 ft.

V. orientalis (Syn. *Ampelopsis orientalis*).—This has fine triangular leaves of much charm. Height, 18 ft.

V. quinquefolia (Syns. *Ampelopsis hederacea*, *A. quinquefolia*).—This, the well-known VIRGINIA CREEPER, is a non-clinging creeper, whose pretty leaves are so finely tinted in autumn. The variety *hirsuta* (Syn. *Ampelopsis hirsuta*) has rather hairy leaves, and the variety *major* has larger foliage. Height, 30 ft.

V. Roylei.—Syn. *V. inconstans*, which see.

V. Sieboldii.—Syn. *V. Thunbergii*, which see.

V. striata (Syn. *Ampelopsis sempervirens*, *H.E.*).—This is sometimes sold as the EVERGREEN VIRGINIA CREEPER, but it is not nearly such a good plant in any respect as *V. quinquefolia*, especially as regards autumn colouring. Height, 15 ft.

V. Thomsonii.—This is a lovely climbing plant with highly ornamental leaves tinged with purple. Height, 20 ft.

V. Thunbergii (Syns. *V. ficifolia* and *V. ficifolia Sieboldii*).—This has larger leaves than *V. Coignetiae.* The foliage is exceedingly beautiful at all seasons. Height, 30 ft.

V. Veitchii.—Syn. *V. inconstans*, which see.

V. vinifera purpurea.—This, the TEINTURIER GRAPE, a variety of the common Vine is mentioned because of the beautiful purple colouring of the foliage. Height, 20–30 ft.

V. vulpina (Syn. *V. rotundifolia*).—This, the FROST or RIVERBANK GRAPE, has small rounded leaves glossy above and below. It has musky purplish fruit about ½ in. in diameter and without bloom. Height, 18 ft.

Wistaria chinensis (Syn. *Glycine chinensis*, *H.D.*).—The CHINESE WISTARIA, with purple or white flowers from May onwards. Height, 20 ft.

W. frutescens (Syn. *Glycine frutescens*, *H.D.*).—The SHRUBBY WISTARIA, with purple flowers in July. Height, 10 ft.

W. japonica (Syn. *Milletia japonica*, *H.D.*).—The JAPANESE WISTARIA, with white flowers from June to August. Height, 10 ft.

W. multijuga (Syn. *W. grandiflora*, *H.D.*).—The LARGE-FLOWERED WISTARIA, with purple flowers from June to September. Height, 20 ft.

S. A.

See also *CONSERVATORY.*

CLIMBING COBÆA (*Cobæa scandens*). See *CLIMBING AND TRAILING PLANTS.*

CLIMBING ERCILLA (*Ercilla volubilis*).—See *CLIMBING AND TRAILING PLANTS.*

CLIMBING FERN (*Lygodium japonicum*).—See *FERNS AND FERN GARDENING.*

CLIMBING FRENCH BEANS.—See *BEANS.*

CLIMBING HYDRANGEA *Schizophaga hydrangeoides*).—See *CLIMBING AND TRAILING PLANTS.*

CLIMBING MONKSHOOD (*Aconitum volubile*).—See *CLIMBING AND TRAILING PLANTS.*

CLIMBING NASTURTIUM (*Tropaeolum majus*).—See *CLIMBING AND TRAILING PLANTS* and *NASTURTIUM.*

CLIMBING PLANTS.—See *CLIMBING AND TRAILING PLANTS* and *CONSERVATORY.*

CLIMBING POLYANTHA ROSES.—See under RAMBLER ROSES in *ROSE CLASSES.*

CLIMBING ROSES.—See *ROSES FOR ALL PURPOSES.*

CLIMBING THUNBERGIA (*Thunbergia alata*).—See *CLIMBING AND TRAILING PLANTS.*

CLINOPODIUM.—Now included in the genus *CALAMINTHA.*

CLISSIOCAMPA.—See LACKEY MOTH in *INSECT PESTS.*

CLIVIA (Syn. *Imantophyllum.* Nat. Ord. Amaryllidaceæ).—This is an ornamental foliage plant with glossy green leaves, bearing beautiful trusses of flowers in varying shades of orange-scarlet, and is also a most useful plant for the decoration of the conservatory and for the dwelling-house during the spring months. It is increased by division of the suckers on the old plant and by seeds, which latter should be sown as soon as ripe. Keep it moderately dry in winter. Pot in rich loam and sand. Temperature required in winter 40–45° F.

Greenhouse Species and Varieties.—*Clivia citrina.*—Yellow. Flowers from March to April. Height, 1–2 ft.

C. miniata Favourite.—Orange yellow. Flowers in March. Height, 1–2 ft.

C. m. Olympia.—Orange scarlet. Flowers in March. Height, 1–2 ft.

C. m. Optima.—Bright orange scarlet. Flowers in March. Height, 1–2 ft.

C. m. splendens.—Dark orange. Flowers in March. Height, 1–2 ft.

C. m. superbum.—Bright orange. Flowers in March. Height, 1–2 ft.

CLOT BUR.—See *XANTHIUM.*

CLOTHING TREE STUMPS.—See *TREE STUMPS : CLOTHING.*

CLOUD GRASS (*Agrostis nebulosa*).—See *ORNAMENTAL GRASSES.* The name is also applied to the genus *AGROSTIS.*

CLOVER.—See *TRIFOLIUM.*

CLOVES.—A name applied to the bulbs or sets of GARLIC and SHALLOTS which are used for planting.

CLUB-ROOT, or CLUBROOT.—See *DISEASES OF PLANTS* and *GREENS : WINTER AND SUMMER.*

CLUB RUSH.—See *SCIRPUS.*

CLUSTER CUP FUNGI.—See *DISEASES OF PLANTS.*

CLUSTER PINE (*Pinus Pinaster*).—See *TREES.*

CLUSTER PINK (*Dianthus capitatus*). See *DIANTHUS.*

CNICUS (HORSE THISTLE. Nat. Ord. Compositæ).—This genus, now including the old genus *Cirsium* (of which *C. arvense* is the troublesome CREEPING THISTLE described in our article on *WEEDS*), contains many undesirable weedy plants of no garden value whatever. One sort only is suitable for the wild garden, namely, *C. Casabonae,* the FISHBONE THISTLE. It is a hardy biennial bearing purplish-blue flowers from June to August and growing about 1 yd. high. The most notable of the weedy sorts are *C. arvensis,* the CORN THISTLE; *C. heterophyllus,* the MELANCHOLY THISTLE; and *C. lanceolatus,* the BURR THISTLE.

CNIDIUM.—Now included in the genus *LIGUSTICUM.*

COBÆA (Nat. Ord. Polemoniaceae). This is an evergreen climber which will grow freely on poles or rafters inside the roof of a greenhouse or conservatory. It thrives in a compost of light loam, peat, and sand, and is propagated by cuttings of firm side-shoots in summer in slight bottom heat, and also by seeds. Temperature needed 40–50° F.

Greenhouse Species. — *Cobæa scandens.* — Purple. Flowers from July to September. Height, 4–20 ft.

C. s. variegata.—Variegated foliage. Flowers light purple, from July to September. Height, 4–10 ft.

See also *CLIMBING AND TRAILING PLANTS.*

COBNUT, FILBERT, AND HAZEL.—See *NUT CULTURE.*

COBWEB HOUSELEEK (*Sempervivum arachnoideum*).—See *SEMPERVIVUM.*

COCCIDÆ.—See under BROWN SCALES in *INSECT PESTS.*

COCHLEARIA. — See *HORSERADISH* and *VIOLET CRESS.* See also under HORSERADISH in *MEDICINAL HERBS.*

COCHLIODA.—See *ORCHIDS.*

COCK'S-COMB GRASS (*Cynosurus echinatus*).—See *CYNOSURUS.*

COCK'S-FOOT GRASS.—See *DACTYLIS*

COCKCHAFER GRUBS.—See under CHAFERS in *INSECT PESTS.*

COCKSCOMB (*Celosia cristata* Nat. Ord. Amarantaceæ).—This is a greenhouse annual averaging 10–30 ins. in height, and requires a very rich soil to bring out its full beauty. Propagation is best effected by seed.

Culture.—If a warm house is available, seed may be sown in February or March, but if a hot-bed is used for germinating the seed, the latter part of April is a better time. A light rich soil should be used for the seedlings, and growth must be fairly rapid to prevent a check. A suitable compost for potting the young flowering plants in is sandy loam two parts, and one part each of leaf-mould and old hotbed manure. As soon as the "Combs" have formed, the most promising plants should be shifted into 7-inch pots, using very rich soil; and when they are thoroughly established, give occasional doses of weak soot water till the colour begins to show on the flowers, after which plain water only is required.

USES.—If grown for bedding purposes, for which they are striking subjects, the plants must be well hardened off before placing in their flowering quarters in June. The most perfect blooms, however, are produced under glass, and they are ideal greenhouse or conservatory plants. The flowering season is throughout late summer and autumn.

Varieties.—The old dark red Cockscomb is practically the only one in the market, though *C. cristata variegata* has prettily variegated leaves.—J. L. G.

COCKSPUR THORN (*Crataegus Crus-galli*).—See *TREES.*

COCOANUT.—See *NUT CULTURE.*

COCOANUT FIBRE.

This is an exceedingly useful material to the gardener, as it is clean to handle and in every way free from objectionable properties. Bulbs may be grown in bowls of it with great success. Pot plants may be plunged in it either outside or in frames, and it can be used as a mulch for certain subjects where the use of rich material would be objectionable. Gardeners should always have a good supply of it handy for use when required.

COCOS.—For best species see *PALMS.*

CODLING MOTH.—See *INSECT PESTS.*

CODLINS AND CREAM (*Epilobium hirsutum*).—See *EPILOBIUM.*

CODONOPRASUM.—Now included in the genus *ALLIUM.*

CŒLIA.—See *ORCHIDS.*

CŒLOGYNE.—See *ORCHIDS.*

COIX (Nat. Ord. Gramineæ).

This is a genus of half-hardy perennial grasses. The best species is *C. Lacryma-Jobi*, the popular JOB'S TEARS, described under the former name in our article on *ORNAMENTAL GRASSES.*

COLAX.—See *ORCHIDS.*

COLCHICUM (MEADOW SAFFRON. Nat. Ord. Liliaceæ).—This is a genus of hardy herbaceous plants with bulbous roots. It is quite distinct from the garden *CROCUS*, on which a separate article appears, although often confused with it, as one of its species (*C. autumnale*) is popularly known as AUTUMN CROCUS, while a true member of the Crocus genus (*C. sativus*) is conversely known as the SAFFRON CROCUS. Both these plants are dealt with under CROCUS in our article on *MEDICINAL HERBS.* There are hosts of other species and synonyms, but none of them are of any great importance, so are not named here. They are all very poisonous plants.

NEW VARIETY.

Colchicum illgricum superbum.—This has rosy-purple flowers with a white base. Its tube is 3–4 ins. long.

See also under CROCUS, AUTUMN, in *MEDICINAL HERBS.*

COLD FRAME or PIT.—See *GARDEN FRAMES.*

COLD GREENHOUSE.—See *GREENHOUSE: COLD AND UNHEATED.*

COLEUS (Nat. Ord. Labiatæ).—

This is an evergreen shrub of easy culture. Amongst the hybrids many fine kinds with distinct foliage can be obtained by seed the first season. Cuttings may be struck in heat in spring. The soil should be of loam, peat, and sand. Temperature required 50–55° F.

Greenhouse Species.—*Coleus thyrsoideus.*—An exceedingly handsome plant. The branches terminate in erect panicle-like racemes of ten to fifteen bright blue flowers, with a spike over a foot in length. The flowering period is from November to February, and the height of the plant ranges from 1½–3 ft.

COLEWORT (*Brassica oleracea*, Nat. Ord. Cruciferæ).—These are popularly known as BUNCH GREENS, thousands of them finding their way to our large markets each year; the tenderness of the young leaves coupled with their sugary flavour, making them acceptable at tables where the more popular large growing varieties of cabbage would not find favour.

Culture.—To supply heads for early autumn use, seed should be sown as early in April as the state of the soil allows, other sowings being made a month later to carry on the supply throughout the winter.

It is important the seed be sown on a rich, and firmly-trodden bed. Sow thinly in drills 6 ins. apart; this is preferable to the more common plan of sowing broadcast. The seedlings should be transferred to permanent quarters when about 6 ins. high, a foot each way being ample for the development of the small heads.

Like all members of the Brassica tribe, these thoroughly appreciate a rich root run, and where this is not provided, the growth will be slow, and the table quality when cooked sadly inferior to Coleworts given a more generous diet. Plenty of moisture at the root should be given until the plants have taken well hold of the soil, after which the hoe should be freely used between the rows. An occasional watering with liquid manure, or a light sprinkle of Nitrate of Soda, given between the plants and well stirred into the soil with the hoe will assist them greatly.

The most useful variety is that known as *Rosette*, which forms a fair-sized compact growing head, every leaf of which has some culinary value.—F. R. C.

COLLEGE COURSE.—see *GARDENERS.*

COLLERETTE DAHLIAS.—See *DAHLIA: CULTURE OF.*

COLLETIA.—For the best species see *SHRUBS.*

COLLIER.—See under BEAN APHIS in *INSECT PESTS.*

COLLINSIA (Nat. Ord. Scrophulariaceæ).—This is a family of useful hardy annuals which are of branching habit and bear small Snapdragon-like flowers, mostly disposed in tiers along the growth. They are easily raised from seeds sown in March or April, or in the autumn in a sheltered position. In the first case the plants should be thinned out to 6 ins. apart each way; in the latter they must be transplanted to that distance in the early spring. We describe the best species below:—

Collinsia bartsiaefolia (Syn. *C. hirsuta*).—There are white and purple varieties of this summer flowering sort, both of which grow to 1 ft. high.

C. bicolor (Syn. *C. heterophylla*).—This is a useful town plant suitable for groups in flower borders. It bears white or lilac flowers throughout the summer, and grows 1½ ft. high. The variety *candidissima* is pure white.

C. corymbosa.—This bears white and grey-blue flowers throughout the summer. It is of branching habit, and grows 9 ins. high.

C. grandiflora.—This is a purplish-blue summer flowering sort which grows about 1 ft. high.

C. tinctoria (Syn. *C. septemnervis*). —This pink summer flowering sort grows 1 ft. high.

C. tricolor.—Syn. *C. verna,* which see.

C. verna (Syn. *C. tricolor*).—This is a purple and blue summer flowering sort which grows 1 ft. high.

COLLINSONIA (Nat. Ord. Labiatæ). This genus is not at all largely grown, but it may well be included in the hardy herbaceous border where the collection is somewhat extensive. It is of easy culture, thriving in any ordinary soil in moderately damp spots, and is not hard to increase by division of the roots in February or March, at which time it may suitably be planted.

What to Grow.—Room need not be found for more than one or two of the following three species :—

Collinsonia anisata.—A yellow October flowering sort averaging 1 yd. in height.

C. canadensis.—Probably the most popular sort. All the varieties of this bear yellowish or pale purple blooms in September or October, and average about 1 yd. in height.

C. scabriuscula (Syn. *C. tuberosa*). —A yellowish sort flowering rather earlier than either of the above, coming out as it does in August. It is not so tall either, averaging rather less than 2½ ft. in height.

COLLOMIA (Nat. Ord. Polemoniaceæ).—Most of the species of Collomia known in gardens are hardy annuals readily raised from seeds sown either in the spring or autumn. So far they have not attained to any large measure of popularity, but the bright flowers are attractive, and the genus seems to warrant the attention of raisers. The following species love sunshine and flower most freely if grown in rather poor soil :—

Collomia coccinea (Syn. *C. lateritia*).—This is the best of the cultivated annual species. It produces bright scarlet flowers throughout the summer, and averages 1½ ft. high.

C. gilioides (Syn. *C. glutinasa*).—This red or pink sort blooms freely in the autumn, and averages 1½ ft. high.

C. grandiflora.—This red or pink sort flowers in July and August, and grows 2 ft. high.

C. heterophylla.—This produces purple flowers throughout the summer, and rarely exceeds 1½ ft. high.

C. linearis (Syn. *C. tinctoria*).—This red or yellow-brown sort flowers in the early summer, and grows about 1 ft. high.

COLORADO BEETLE.—See *INSECT PESTS.*

COLORADO WHITE FIR (*Abies concolor*).—See *TREES.*

COLOUR BEDS.—See *COLOUR GARDENING : SINGLE COLOUR BEDS.*

COLOUR GARDENING : COLOUR SCHEMES.—Colour gardening is not just a luxurious phase of horticulture, but something which plays an essential part, if one is to see the various brilliant flowering subjects employed in a perfectly natural setting,—a fact which gives the owner of a small garden just as much scope as the possessors of spacious grounds. Our first examples of colour gardening will, therefore, be devoted to the smaller beds and borders, as being likely to appeal to the greater number, and happily there are many charming combinations possible even on this restricted scale.

In a border from 15–20 yards in length, no attempt should be made to display many colours ; a finer effect is possible by relying on blue, salmon, and white.

Pillars of Roses such as *Lady*

Godiva (salmon-pink) and *White Dorothy* are very effective as a background in such a border, whilst the best flowering subjects in blue, salmon, and white for the height of summer would include blue Anchusas, and blue Delphiniums such as *Mark Twain* and *Charles Reade*, salmon Phloxes such as *Elizabeth Campbell*, *Fort de France*, and *Sheriff Ivory*, the perennial *Chrysanthemum maximum* (*King Edward VII*) and the beautiful Madonna Lily supplying the white.

Along the front of the border patches of the charming salmon-pink *Carnation Raby Castle* may be used, towards the back the stately *Campanula pyramidalis* in blue or white, or in the back rows, clumps of Sweet Peas in the requisite shades. Spring effects in the same colours may be obtained by edging with white Arabis and blue Chionodoxas, whilst salmon may be introduced by making use of imposing clumps of Darwin Tulips, *Duchess of Westminster* and *Salmon King*. Autumn colouring in the same shades is possible if Border Chrysanthemums such as *Débutante*, *Framfield's Early White*, and *Tapis de Neige* (all white), are used; while blue will be represented by the second blooming of the Anchusas and Asters, *Blue Bird* and *Feltham Blue*; salmon by the use of Dahlias approaching that shade, and the last blooms of *Lady Godiva Rose*.

Another very pretty soft effect may be obtained by the massing of white, mauve, and lavender. There are many subjects from which one might make a choice to carry out a scheme of this kind, but it should be mentioned that Michaelmas Daisies grouped in these colours only, make a glorious autumn display. One more example will suffice for demonstrating the possibilities of colour-blending on a small scale, and this concerns a wonderfully pretty effect obtained by the writer, by simply dotting a large bed with vermilion autumn-flowering Tritomas, surrounding them with white *Southcote Beauty Aster*.

Broad Borders.—Briefly, the effect to be aimed at here should be one of real harmony in the relationship of the various brilliant subjects used, rather than violent contrasts.

Each colour must be massed in strength enough to be impressive, without being so dominant as to become obtrusive; let the effects obtained be natural. The planter should avoid trying to improve upon Nature's colouring, but must rather aim at placing every colour in a natural setting.

In planting for a colour progression remember that the plants bloom in varied seasons. This makes it imperative to use the various subjects with a view to keeping up a long succession in the desired colours. For example the Doronicums, the earliest golden-yellow flowers to bloom, must be placed in close proximity to the Helianthuses, the last to bloom in the same hue.

Colour Progression.—By this is meant that, looking at the border from either end, the colours should all blend, so that each plant enhances its neighbour's beauty. To obtain this effect begin with white flowers, intermingled with silvery-grey foliage plants. Next to this pink and rose shades might be placed, followed with light blue, and working on into the strongest shades of that colour.

Blue associates charmingly with yellow, so place this colour next, leaving warmer tones such as crimson, red, and scarlet an honoured place in the centre of the whole arrangement. If a foil of white is objected to, between orange and crimson, carefully grade all these warm tones from red to orange. After thus disposing of the reds, follow on with a batch of pale yellow, and finish up with lilac and purple shades, which form a really charming combination.

Bearing this in mind, other salient points to observe are that the principal value of white flowers lies in the fact of their use as a foil between bright and varying hues. Employed thus they lose much of their natural coldness, but at the same time it is well to avoid the repetition of white patches along the length of the border, otherwise it might prove tiring to the everyday observer.

Pink and rose shades are entrancing with yellow and blue, whilst silvery-grey foliage plants are invaluable as a set-off, if used beneath taller-growing, brightly coloured flowers.

Background and foreground both play their part in a colour border, and in connection with the latter point, avoid all formal edging, having (if a grass verge is not possible) a low-stone edging, because this makes it possible to plant alpine subjects of a spring-flowering character. As far as background is concerned, some hold that none is required beyond that provided by the tall-growing subjects in the back rows. That may be. If the colour gardener has to plant against a wall, old stone is preferable to bricks. If climbers are introduced, avoid subjects which would clash with occupants of the border; patronise Ceanothuses, Clematises, Climbing Roses, and Wistarias in the colour required.

Where there is no wall, pillars of Roses and clumps of Sweet Peas would not only form an effective background but greatly assist in the general colour scheme.

A selection of plants to carry out the colour progression advocated is here appended, and if some well-known kinds are absent, it is because the writer contends that in planting for colour effect, the subjects selected must be vigorous in growth, as well as effective in blooming.

SOME SUITABLE SELECTIONS.

Blues (Pale and Dark).

First Row (*i.e.* Back Row).—Asters Blue Bird, Climax, and Feltham Blue; Delphiniums Capri, Geneva, Jupiter, King of Delphiniums, and Orion; Echinops Ritro; Galega Hartlandi; Sweet Peas Captain of the Blues, Lord Nelson, Royal Blue, and Southcote Beauty.

Second Row.—Aconitum Wilsoni; Aster cordifolius, Aldeboran, and Paragon; Campanula pyramidalis; Delphinium Geneva; Salvia nemerosa virgata.

Third Row.—Aconitum Fischeri; Aster Amellus, Bedding Queen, Emma Bedau, Onward, and Orion; Campanulas latifolia and macrantha; Clematis Davidiana.

Fourth Row.—Anchusa italica, Dropmore Variety and Opal; Erigeron The Quakeress; Phlox Le Mahdi, and Ouragan; Scabiosa caucasica.

Fifth Row.—Campanula persicifolia; Iris germanica, Clio, Maritana, Mrs Kessler, and Nationale; Linum narbonense; Verbena venosa; Veronica spicata.

For Stone Edging.—Anchusa Myosotidiflora; Aubrietias Dr Mules, Perry's Blue, and Prichard's A1; Campanula Riverslea; Linum alpinum; Nepeta Mussini; Phlox G. F. Wilson; and Veronica prostrata.

Crimson, Red, and Scarlet.

First Row (*i.e.* Back Row).—Aster Novae-Angliae, Mrs J. F. Rayner; Dahlias Charles Ducrot, Dormouse, John Riding, and Meteor; Eupatorium purpureum; Hollyhock Crimson King; Rose (for pillar) Hiawatha; Sweet Peas Edward Cowdy, Maud Holmes, and Sunproof Crimson.

Second Row.—Dictamnus Fraxinella; Kniphofias Saundersi and Cloto; Lychnis chalcedonica; Lilium chalcedonicum; Malope grandiflora; Monarda didyma.

Third Row.—Anemone japonica Prinz Heinrich; Antirrhinums (tall), Deep Crimson and Fiery Belt; Delphinium cardinale; Paeonies Henri Demay and Louis Van Houttie; Phloxes George A. Strohlein and Thomas Swanston.

Fourth Row.—Lobelia cardinalis; Papaver Beauty of Livermere; Pentstemons Ariel, Damocles, Ethel Howe, and Newbury Gem; Potentillas Flambeau and Le Vesuve; Pyrethrums Captain Nares and Lord Rosebery.

Fifth Row.—Chrysanthemums Crimson Pride and Goacher's Crimson; Delphinium nudicaule; Gladiolus Brenchlyensis; Heuchera brizoides; and Primula japonica.

For Stone Edging.—Helianthemums Red Dragon and venustum plenum; Saxifrages Ditton Crimson, Mrs D. Hudson, and Ware's Crimson.

PINK AND ROSE.

First Row (i.e. Back Row).—Asters Lil Fardell and Rosy Morn; Astilbe Davidii; Hollyhock Rose Queen; Lavatera Olbia; Rose (for pillar), Blush Rambler; Sweet Peas Barbara, Doris Usher, and Queen of Pinks.

Second Row.—Asters Elsie Perry and Perry's Favourite; Astilbe Peach Blossom; Dahlia Delice; Dicentra spectabilis; Phloxes Elizabeth Campbell, La Siecle, Sheriff Ivory, and Wm. Robinson.

Third Row.—Chelone Lyoni; Clarkia Carnation Flaked; Phlox Mrs Oliver; Pyrethrum Queen Mary; and Saponaria officinalis flore pleno.

Fourth Row.—Clarkia Salmon Queen; Paeonies The Queen and Reine Elizabeth; Papaver Blush Queen; Pentstemon Pink Beauty; Pyrethrum Hamlet; and Sweet William Pink Beauty.

Fifth Row.—Antirrhinums Carmine Pink and Delicate Pink; Carnation Raby Castle; Heuchera Pink Pearl.

For Stone Edging.—Gypsophila prostrata rosea; Helianthemum Sunbury Gem; and Saxifragas umbrosa and Wenlock's Best of All.

WHITE.

First Row (i.e. Back Row).—Aster Novi Belgii White Climax and White Queen; Bocconia cordata; Dahlia Queen Mary; Hollyhock White Queen; Romneya Coulteri; Sweet Peas Constance Hinton and King White.

Second Row.—Delphinium Moerheimi; Galega officinalis alba; Galtonia candicans; Lilium candidum; Phlox pyramide; and Spiraea Aruncus.

Third Row.—Campanula pyramidalis (white); Cimicifuga cordifolia; Gypsophila paniculata; Paeonies superba and Whitneyi; Phloxes Snowdon and Tapis Blanc.

Fourth Row.—Antirrhinum Pure White; Irise Bridesmaid and Innocence; Pentstemons Antarctic and Galatea; and Pyrethrum Aphrodite.

Fifth Row.—Achillea The Pearl; Anemone alpina; Stachys lanata; Trillium grandiflorum; and Veronica spicata alba.

For Stone Edging.—Arabis albida; Arenaria grandiflora; Asperula odorata; Campanula carpatica alba; Campanula pusilla alba; and Iberis sempervirens superba.

YELLOW.

First Row (i.e. Back Row).—Dahlia Brentwood Yellow; Helianthus Miss Mellish; Hollyhock Prince of Orange; Rudbeckia Golden Glow; Solidago Golden Wings; Sweet Peas Hon. Mrs E. Kenyon and Primrose Queen; and Verbascum olympicum.

Second Row.—Alstroemeria aurantiaca; Helenium autumnale; Kniphofia Tuckii; Solidago Golden Locks; and Verbascum caledonia.

Third Row.—Anthemis tinctoria Kelwayi; Coreopsis grandiflora; Eremurus Wareii; Helenium Riverton Beauty; Kniphofia Star of Baden Baden; and Rudbeckia speciosa.

Fourth Row.—Antirrhinum Cloth of Gold; Gaillardia Lady Rolleston; Hemerocallis Lemon Queen; and Trollius Orange Globe.

Fifth Row.—Aquilegia chrysantha; Heleniums Bigelovii and Hoopesii; and Trollius grandiflorus.

For Stone Edging.—Adonis vernalis; Alyssum saxatile; Genista humifusa; and Violas Bullion and Klondyke.

NOTES.—The foregoing list contains just a few of the many good things available. The lilac, mauve, and lavender section is best represented in the Michaelmas Daisies and Flag Irises. The list has been divided into rows not for rigid planting as set out, but more as a general indication of how the plants should be graded in height from the back.

So much reference has been made to subjects with silvery-grey foliage, that an enumeration of the principal kinds is due to the reader. Amongst these are *Cerastium tomentosum* (silvery-grey foliage and white flowers), *Cineraria maritima* (silvery laciniated foliage and yellow flowers), *Geranium argenteum* (rose flowers and silver foliage), *Glaucium flavum* (silver glaucous foliage and yellow flowers), and *Thymus Serphyllum album* (white flowered and sheets of attractive foliage).

Colour Schemes with Annuals.—For obtaining brilliant colour effects it is doubtful if annuals can be surpassed when properly arranged. For example, a border composed entirely of Godetias in varying shades produces a gorgeous effect. A long border, with the variety *Apple Blossom* in the back row, *Duchess of Albany* (white) in the second row, with *Dwarf Pink* and *Afterglow* (scarlet-crimson) for the outside rows, produces a charming effect. Larkspurs also pay for attention in colour-grouping, and a bed of the variety *Rosy Scarlet,* surrounded with yellow ten-week Stocks, is very fine, especially in the soft evening light.

Antirrhinums, although not strictly annuals, are generally treated as such, and their adaptability to colour-blending is well known, their wide range of tints (or shades) giving the colour gardener great scope.

In planting small beds, only one variety must be used; but in large circular beds, brilliant effects may be achieved by planting a crimson variety in the centre, making a belt of white and yellow around this colour, next a belt of orange, finally edging the bed with a dwarf yellow variety.

Pretty as this bed would be, it could be surpassed if a slightly-raised long border, backed with an ivy-clad wall, is available. In this event a pale yellow sort in the back rows, followed by apricot, and then a ribbon of orange, finishing with coral-red in the row next to a dwarf-yellow edging, is a revelation of the possibilities of colour combinations. Large beds on lawns can be charmingly filled if clumps of Sweet Peas in yellow and cream shades are surrounded by the tall *Antirrhinum Orange King.* Generally speaking other annuals, such as Asters, Clarkias, Cosmos, Cyanus, Nasturtiums, and Stocks, as well as Lavateras, Nemesias, and Salpiglossis, show to much better advantage when only one variety is planted in each bed.

Good edging annuals are Candytuft, Dianthus, Dimorphotheca, Linum, Mignonette, and dwarf Phlox (*i.e.* Drummondii). There is little difficulty in arranging any of these for colour effect, especially if a soft, restful setting instead of hard gravel pathways is available.

The importance of proper colour-blending in the garden, it might be said in conclusion, is not only from the purely artistic point of view, but is also health-giving, for it has been well and truly stated that few people realise the effect colour has on the course of one's life and character.—F. W. M.

COLOUR GARDENING: Single-Colour Beds.—The wealth of floral material now available facilitates the employment of pleasing one-colour schemes at, practically, all seasons, without sacrificing that variety necessary to create and sustain interest in formal flower gardening. In such schemes harmonious groundwork or tasteful edging of foliage plants, or even the more modest flowering subjects, is not only permissible but actually demanded to do justice to the *pièce de resistance.*

While the finest spring, single-colour effects are, perhaps, obtained by planting distinct varieties of Hyacinths, Early and May-flowering Tulips, and other bulbous subjects *en masse,* economy demands spacing out, which in its turn necessitates the employment of a suitable groundwork for pleasing effect. Here, the double-flowered *Arabis albida,* in quiet, grey-shaded foliage, and silvery, unobtrusive flowers, combines splendidly with most things. *Tulip Pink Beauty* on such a carpet is a revelation.

By accident, rather than design, was revealed the best spring harmony in blue probably ever obtained. This, the filling in of beds which had a permanent substantial edging of London Pride (*Saxifraga umbrosa*), with Royal Blue Forget-me-not, the flowering of the two contemporaneously producing that æsthetic shade of colour sometimes seen ascending heavenward 'twixt the trees from the wood fire of a country cottage chimney. This, amplified by cross-banding, either bed or border, right and left diagonally, resulting in diamond panels filled in with blue Forget-me-not, even goes one better in unique effect from the near distance, and although perfectly simple is simply perfect.

For warmth of spring colour tone the old form of *Silene pendula* from seed sown in August for transplanting to the beds, and bordered with pink Saponaria of the same soft hue, makes a charming *coup d'œil* in the spring garden. The free habit of the typical Silene, which results in its growing up into a glowing mass, is preferable for this purpose to its restricted variety, *S. p. compacta.* The glory of glowing colour perhaps in this direction is attained in *Saponaria Scarlet Queen,* to be similarly raised in the autumn for transplanting, although either Saponaria seems less amenable to enduring winter severity. Dean's hybrid Primroses are very beautiful for spring work, if we select from the seed-bed plants of one-colour tones, although some liberty may be allowed in the variety, which is almost infinite.

The rose garden contrived on the single-colour bed scheme, each bed being devoted to one variety, and leading in a series of colour-beds and gradations of colouring, from the pure white of *Snow Queen* (née *Frau Karl Druschki*) to a central mass of the glowing crimson *General McArthur,* makes a right royal rose garden. On the larger scale of the rose garden the planter has a wealth of material in the various sections of dwarf Polyantha, Teas, Hybrid Teas, and Hybrid Perpetuals to select from, to which the Wichuraiana may be added in judicious arrangement and disposal on pillar, arch, or series of arches to complete a scheme inherently capable of making the very apotheosis of the Rose, "the very fairest flower that blows."

Yellow Roses, with a charm peculiarly their own, well deserve a parterre to themselves, and for a dozen beds in pairs the following are admirably adapted, commencing with the lemon-yellow of *Alex. Hill Gray* (T.), and finishing with *Golden Spray*

(H.T.), the free habit of the latter commending it for the central position, the intervening varieties in order being *Duchess of Portland* (H.T.), *Golden Emblem* (H.T.), *Lady Hillingdon* (T.), and *Madame Ravary* (H.T.).

Annuals and biennials provide a maximum of interest and summer beauty at a minimum of expense. Of the latter none can excel the bright floriferousness of Antirrhinums,[1] preferably the intermediate type, in distinct colours. With these alone the whole gamut of colour can be run, and the garden made gay the season through, such being raised from seeds sown early in the spring under glass, or autumn raised plants, hardier grown, under the protection of a cold frame. Either for box-edged beds, or beds simply cut in the turf, these Snapdragons in pure white, soft lemon-yellow, peerless pink, golden chamois, or deep crimson give a range of colour which affords them high rank for our purpose. As a pure white annual, flowering the season through (provided seed-bearing on the first spikes is prohibited), the Hyacinth-flowered Candytuft is unsurpassed; its companions, *Carmine Queen*, and the older lilac-purple form, golden, crimson, and white Mignonette, if more modest in tone, are as adaptable as they are indispensable in any flower-garden scheme. For colour effect at a minimum of expense and labour, dwarf Tropaeolums (Nasturtiums) are a host in themselves as far as scarlet, maroon, terra-cotta, pale yellow, and old gold are concerned. With the latter, nevertheless, hard-tramped, poor soil is *the* flowering secret, and if seeds are dibbled into such a medium, 6 ins. apart, in April, germination is rapid, gross leafage avoided, and the effect is pretty well continuous if seeding is not allowed.

For colour comfort it is yet a question if anything can vie with the scarlet Geranium (*Pelargonium*), given such brilliant kinds as *Paul Crampel*, disposed *en masse* on a complimentary colour carpet of well-kept greensward, a silver-leaved variety being utilised as its edging. Such, indeed, is able to light up a whole landscape within eye range, Very different, but quite charming. is the old-fashioned plan of planting the pretty purple, half-hardy *Verbena venosa* on a groundwork of the equally old-fashioned *Pelargonium Manglesii*, a well-raised bed of such being peculiarly telling in its refined beauty.

Very pleasing winter effect is gained by the employment of shrubby foliage plants *en bloc*, and beds of such may well come into present consideration in any scheme of flower gardening, including the terraced garden. Distinct foliage subjects will be found in *Cassinia* (Diplopappus) *fulvida*, the quieter but not less distinct *Griselinia littoralis*, while blocks of *Mahonia* (Berberis) *Aquifolium*, annually clipped till more or less solidity results, give grand effect in red-bronze vividly renewed each spring. In conclusion, all the above, proved in practice, are but little more than suggestive of a subject practically inexhaustible.—E. K.

COLOUR SCHEMES.—See *COLOUR GARDENING: COLOUR SCHEMES*.

COLTSFOOT (*Tussilago Farfara*).—See *TUSSILAGO* and *WEEDS*.

COLUMBIAN BARRENWORT.—A name applied to *VANCOUVERIA*, which see.

COLUMBINE.—A popular name for the genus *AQUILEGIA*, which see.

---

[1] Antirrhinums are by many people considered as perennials. They may, however, be treated as biennials, and are largely grown as such still.—EDITOR.

COLUTEA.—For the best species see *SHRUBS.*

COMARUM.—Now included in the genus *POTENTILLA.*

COMFREY.—See *MEDICINAL HERBS* and *SYMPHYTUM.*

COMMELINA[1] (DAY FLOWER. Nat. Ord. Commelinaceæ).—One species of this, *C. communis*, is a pretty hardy annual bearing blue-purple flowers from June onwards, and growing 1–2 ft. in height. It is of the simplest culture, merely requiring to be sown where it is to grow in March or April and ruthlessly thinned out.

Perennial Border Species.—The two described below are of sterling merit, and should be planted in good rich soil in the early spring. They may be propagated by seeds or root division in the usual way.

Commelina coelestis.—This, which is not quite hardy, bears gloriously blue flowers from June onwards, and grows 1½–2 ft. in height. A white variety *alba* is also useful.

C. erecta (Syn. *C. obliqua*).—This bears lovely blue flowers from August onwards, and grows 1–2 ft. in height.

COMPASS PLANT (*Silphium laciniatum*).—See *SILPHIUM.*

COMPENSATION FOR IMPROVEMENTS: THE LAW AS TO.—See *GARDENING LAW.*

COMPOSTS.

The question of providing a suitable compost for the various plants he cultivates is often a source of much anxiety to the beginner in greenhouse gardening, and although the present race of growers are not nearly so exacting in the preparation of potting composts as those of the "old school," even to-day, when conditions are made much more favourable to plant-growth under glass than formerly, it is useless expecting the best results to follow if a plant is not given something approaching an ideal compost for the roots to feed upon. Unless this is provided, many plants, although not positively dying at once, soon become sickly, and a prey to various pests and diseases.

Without wishing to make light of what experts have written regarding the most suitable composts for various popular greenhouse plants, we may fairly claim that any one having a stack of really good fibrous loam, peat, and well-decayed leaves from Oak or Beech trees, together with some sharp silver sand and well-decayed manure, has at his disposal the material for making up a compost well suited for any plant of which he is likely to undertake the cultivation.

Good fibrous loam which has been stacked at least a year or more, should be the foundation of all composts for what are termed soft-wooded greenhouse plants, and if to this is added one-third good flaky leaf-soil, and the same of well-decayed manure, also an eighth part coarse sand, a compost capable of growing magnificent specimens of Fuchsias, Geraniums, Heliotropes, and almost all the half-hardy tender greenhouse plants or annuals will be at his disposal.

Plants of more robust growth than those mentioned, or others expected to remain in the same pot for a considerable time, may have a little of one of the advertised plant-foods added.

Azaleas, Heaths, Palms, and the majority of Ferns appreciate good fibrous peat and plenty of sand, in fact many growers add nothing else, but where peat is not easily obtained equal parts fibrous loam may be added.

---

[1] A number of greenhouse and stove evergreens are purposely omitted from this article, the first as they are comparatively unimportant, and the second as they are beyond our present scope.—EDITOR.

Arums, Agapanthuses, Clivias, and similar plants having large fleshy roots, prefer a compost in which good yellow loam predominates.

Generally speaking a very rich soil is not desirable for plants having variegated or highly-coloured foliage; a poor soil being more likely to bring out the various markings than one made rich with manure.

Cucumbers and tomatoes give heavier crops when planted in turfy loam, to which not more than one-third of old manure has been added at the start; reliance being placed upon the judicious use of artificial or liquid manure to maintain these in a fruitful condition.

Old potting soil from any of the above, if put through a fine sieve, answers well for pricking out bedding plants of all kinds, while loam, leaf-soil, and sand in equal parts form a good striking compost for cuttings of the most popular greenhouse plants.

It should be noted that thorough mixing of each of the above composts is of vital importance, and a sharp lookout should be kept for harmful insects.

During the winter months the compost should be prepared, and allowed to stand in the greenhouse a few days before using, in order that it may get warmed through.

F. R. C.

[Composts for special plants will be found under their respective headings elsewhere in this book.—EDITOR.]

COMPOUND FERTILISERS.—See *MANURES.*

COMPSOA.—Now included in the genus TRICYRTIS.

CONCRETE.—See *MORTAR.*

CONDUCTING TISSUES.—See under TISSUES in *PLANT PHYSIOLOGY.*

CONDY'S FLUID.

This is most useful as a deodoriser and disinfectant. Weak solutions, such as a dessertspoonful per gallon, have been found useful, however, for mild fungoid attacks.

CONE-FLOWER.—See *RUDBECKIA.*

CONGLOMERATES.—See under SANDSTONE in *ROCKWORK.*

CONIFER ROOT ROT.—See *DISEASES OF PLANTS.*

CONIOGRAMME.—Now included in the genus GYMNOGRAMME, for which see *FERNS AND FERN GARDENING.*

CONIOSELINUM.—Now included in the genus *LIGUSTICUM.*

CONIUM (Nat. Ord. Umbelliferæ).

This is a genus of coarse growing weedy plants of little value save in the wild garden. The best species is *C. maculatum*, better known as HEMLOCK, the culture and properties of which are fully described under that name in our article on *MEDICINAL HERBS.* It must be carefully distinguished from WATER HEMLOCK (*Cicuta virosa*), on which we give a separate note.

CONSERVATORY.

The Conservatory of whatever design, be it elaborate and costly, or plain and economical, must be so constructed that the gardener may have the opportunity of displaying his skill, and repaying his employer with a rich and varied collection of well-grown plants and flowers at all seasons of the year, so that they may at all times arouse admiration, and be enjoyed to the full, for their many forms, colours, and perfumes. The ideal structure must admit the maximum amount of light; it should have a south, south-east, or south-west aspect; and be fitted with up-to-date top and bottom ventilators; and an adequate heating arrangement that will ensure the desired temperature without in the slightest degree overheating the pipes. Light and heat are two important factors governing the life of plants and flowers; prolonging, or shortening, as the case may be with good or bad management. The atmosphere must at all times be kept genial and buoyant by admitting the proper amount of air without causing cold draughts.

The arrangement of plants in bloom at all times must be of a light, pleasing, and decorative style, combined with a harmonious blending of colours. A conglomeration of all the plants and flowers that can be collected together, irrespective of size and colour, gives a very bad effect. The larger the group the more scope there is for an effective display.

In arranging the plants commence as high as possible and taper to the ground, with here and there the best plants standing up at varying heights to catch the eye and take away all formality of arrangement. Each plant must, however, be given ample room to show itself individually.

The combination of colours enhances or mars a group, and a medley of colours suits but few tastes. It is better usually to arrange good groups of plants of one, two, or three colours together, rather than to rely on a general mixture. Seeds of such plants as Cinerarias, Cyclamens, and Primulas can nowadays be purchased in separate colours to suit individual tastes, and this greatly assists the cultivator in making artistic displays.

What to Grow.—The selection of plants depends largely on individual tastes, but rather grow bold and impressive masses of a few kinds, than get too many on hand. Plants very showy and easily raised from seeds, are:—*Antirrhinum Nelrose*, for spring blooming; Begonias, double, single, crested, and fringed; Calceolarias, herbaceous, and *C. Clibranii*; *Campanula pyramidalis alba*, *Celosia plumosa*, Cineraria large flowered, and *C. stellata*; *Clarkia elegans Salmon Queen* and *Scarlet Gem*; Cyclamen in separate colours, and *Cyclamen Mrs. Buxton*; Gloxinias, Godetia, tall double pink, and the New Lavender variety; *Humea elegans*, Mignonette, *Primula sinensis*, in separate colours, *P. Kewensis*, *P. Malacoides*, and *P. obconica*; Schizanthus large flowered hybrids; Streptocarpus giant flowered, pink and white; Stocks, East Lothian varieties, and *Beauty of Nice*.

Bulbous Plants contribute not a little to the upkeep of the Conservatory. *Lilium longiflorum*, and its variety *Harrisii*, and *L. auratum* in variety, with the improved *L. speciosum* forms, are especially fine subjects. Nerines no doubt have a great future when the new hybrids become better known; they stand in the front rank of autumn blooming plants. *Vallota purpurea*, when grown in good batches, creates a striking display of scarlet. Hippeastrum hybrids in spring are a most gorgeous class of plants, but require heat for their growing season. *Calla aethiopica* is a bold plant, and the yellow Callas are worthy of extensive cultivation. Freesias for their graceful appearance and delicious scent must be included. Hyacinths, Narcissi, and Tulips are very cheerful early in the year when forced, and May-flowering Tulips for spring displays. Lilies of the Valley, both from retarded and natural crowns, are charming in winter and spring, the last, of course, for their pure white flowers and sweet scent.

Hard-Wooded and other serviceable flowering plants include, *Azalea indica*, in many charming shades, *Azalea mollis*, and other hardy shrubs, lists of which may be found in autumn catalogues. Himalayan Rhododendrons, *Cytisus racemosus*, *Deutzia gracilis*, Astilbes, Hydrangeas, *Daphne indica*, and *Aloysia citriodora* are useful for their charming scents. Hybrid Clivias, *Salvia splendens*, Pelargoniums (Zonal, Show, Ivy-leaved and scented-leaved); Fuchsias and Chrysanthemums; and Begonias of the *Gloire de Lorraine* type, or the winter flowering hybrids, are most excellent Conservatory plants, but require a little more heat than ordinary greenhouse temperature.

FOLIAGE PLANTS also play an important part, and just enough greenery must be included with the flowers to give an impressive and good effect. For the most desirable species reference should be made to our article *FOLIAGE PLANTS FOR ALL PURPOSES*.

BASKET PLANTS may be freely used in the Conservatory. Ivy-leaved Pelargoniums, drooping Fuchsias, *Campanula isophylla* blue and white, Achimenes, Begonias (both the tuberous sorts and *Gloire de Lorraine* varieties), and *Asparagus Sprengeri* are all suitable. For others see our article on *BASKET PLANTS*.

CLIMBING PLANTS are numerous, but it is not at all desirable to add too many, nor is it wise to allow them to exclude much light from the roof. However, walls and pillars may be furnished with choice Tea and Hybrid Tea climbing roses, *Acacia Riceana*, *Asparagus plumosus nanus*, *Carpenteria californica*, *Clianthus puniceus*, *Lapageria rosea*, and *alba*; *Plumbago capensis*, *Rhododendron Lady Alice Fitzwilliam*, *Streptosolen Jamesonii*, and any of the half-hardy plants described in the article on *CLIMBING AND TRAILING PLANTS*.

General Management.—Cleanliness in the Conservatory is of first importance, and decaying leaves, with fading flowers, must be removed daily. Staking and tying, to keep up a well-kept appearance which assists greatly in the decorative qualities of the display, should be carefully attended to. Greenfly and Thrips very quickly damage any bloom, and must be dealt with by fumigating when first detected. See article on *FUMIGATING*. Watering, along with the cleaning, must be done in early morning, and it must be understood that plants in bloom require more water than at any other time. Plants well grown and fed for their blooming period, will need no assistance by liquid manures, during their stay in the Conservatory, therefore no disagreeable smells will arise from this source.

The lists of plants named in this article are by no means exhaustive, but simply a selection of cheery, good-natured, and showy plants. Never allow sentiment to prevail over the senses, but periodically discard old favourites, thereby making room for new and up-to-date plants, which inspire and add interest continually in the Conservatory.—D. L.

CONSTANTINOPLE HAZEL (*Corylus Colurna*).—See *TREES*.

CONSTRUCTION OF PATHS.—See *GARDEN PATHS*.

CONTROLLING RUST FUNGI.—See *RUST FUNGI*.

CONVALLARIA.—See *LILY OF THE VALLEY*, and see also under this heading in *MEDICINAL HERBS*.

CONVOLVULUS (BINDWEED. Nat. Ord. Convolvulaceæ).—Although the many annual Convolvuli are extremely beautiful, and the hardy sorts are cultivated with great ease, the flowers are scarcely so popular as they were a generation ago. A spring or autumn sowing will suffice, but very rich soil should be avoided, or growth will be made at the expense of the flowers. Almost everyone has admired the native, perennial, pink-flowered *C. arvensis*, producing sheets of flowers on dry banks. The species that has given practically all the dwarf garden varieties is the Southern European *C. tricolor*. Its broadly bell-shaped flowers vary very greatly in colour from pure white to velvety purple selfs, with many striped and shaded forms. Under cultivation and selection the habit of the plants has been so altered that little of the trailing character remains, but, instead, rounded mounds of neat foliage and gay blossoms are produced. These are very useful for flower or shrubbery borders or for summer bedding, provided they have a sunny site to grow in.

Annual Species.—The best are briefly described below :—

Convolvulus major.—See *Ipomoea purpurea.*

C. tricolor (Syn. *C. minor*).—This is the most popular sort. The variety *alba* has white flowers and *vittatus* striped ones. Garden varieties are not catalogued under name but under their colours, and they come very true to colour from seeds. Thus they can be used for colour schemes. The blue forms are very pleasing, and a deep crimson-violet form has many admirers. The height averages 1–3 ft.

COOKING APPLES.—See SELECTION OF VARIETIES, under months in which they ripen, in *APPLE.*

COOKING PEARS.—See list of PEARS FOR BAKING AND STEWING in *PEAR.*

COOKING PLUMS. — See list of PLUMS FOR COOKING in *PLUM.*

COPPER COMPOUNDS.—See *COPPER AND CUPRUM COMPOUNDS.*

COPPER AND CUPRUM COMPOUNDS.—Metallic Copper is of very little use to the gardener save for making lightning conductors for his greenhouses, or in the form of wire for renewing the fuses in his electric lighting or heating installation. Its compounds, however, form an important class, chiefly as fungicides, though the sulphate has been used as a fertiliser for lawns when added in extremely small quantities to lawn sands. In the copper compounds we have poisonous materials the use of which still requires much experiment, but it is believed that in this element there exists a cure for that fell disease Clubroot if a suitably mild material could be produced at a cheap rate. If applied to the soil, copper must be used in the remotest of small quantities, as up to now it has served to injure rooting rather than to encourage it.

As regards the compounds, Copper Carbonate, Copper Chloride, Copper Oxide, and Copper Phosphate have never yet come to the fore horticulturally, hence it is needless to give details concerning them here.

COPPER ACETATE.—This is not of much use to the gardener, though its basic salt popularly known as VERDIGRIS is sometimes used as an ingredient for indelible ink.

COPPER ACETO-ARSENITE.—This is usually a bright green solid, and is used to a certain extent as a fungicide. It is the chief ingredient in PARIS GREEN (see article on *INSECT PESTS: GENERAL METHODS OF DESTRUCTION*).

COPPER ARSENATE. — This has been suggested as a cure for Wart Disease of Potatoes, and also as a general fungicide. Unfortunately its use has not so far been satisfactory, and no striking results have been obtained. It has undoubted possibilities, however, and experiments with it should be carefully watched.

COPPER NITRATE.—This is a chemical with a future before it in horticulture—of that there can be little doubt. It is suggested that it could be prepared cheaply by adding a solution of Calcium Nitrate (see article on *Lime Compounds*) to a strong solution of Copper Sulphate. This last is very cheap, as most gardeners know. Experiments with the present compound as a cure for clubroot and other diseases are, we understand, in progress, but it is too soon to say with any certainty that it fulfils what is hoped.

COPPER SULPHATE. — This, popularly known as BLUE STONE, is the most important copper compound, and is largely used for the making of Bordeaux and Burgundy Mixtures, and as an ingredient in indelible ink. Its use in the former capacity is described in our article on *Spraying Mixtures and Fungicides*, while the latter use is briefly referred to in our notes on INK in the article on *Garden Labels*.—E.

COPPER SULPHATE.—See *Copper and Cuprum Compounds* and *Weed Killers.*

CORAL BARBERRY (*Berberidopsis corallia*).—See *Climbing and Trailing Plants.*

CORAL-BERRIED DUCKWEED (*Nertera depressa*).—See *Nertera.*

CORAL-BERRY (*Symphoricarpus orbiculatus*).—See *Shrubs.*

CORAL ROOT (*Cardamine bulbifera*).—See *Cardamine.*

CORAL SPOT.—See *Diseases of Plants.*

CORBULARIA.—Now included in the genus *Narcissus.*

CORD GRASS (*Lygeum Spartum*).—See *Lygeum.*

CORD GRASS (*Spartina stricta*).—See *Spartina.*

CORDON FRUIT TREES.

No form of apple or pear tree is so suitable for the garden as the "Cordon," and well-grown cordon trees in full bearing well merit the name, which is derived from the French word denoting string or rope.

Advantages of Cordons. — The main advantages of cordon-grown trees are:—

1. The bearing stage is reached with little or no delay.
2. The maximum weight of fruit is grown on the minimum area of ground.
3. Nothing but the finest fruit is produced.
4. The trees are easily controlled and are within easy reach for thinning fruit, spraying, pruning, and general cultivation, not to mention for the final gathering.

No form is so suitable as the cordon for the average small garden, at the same time being equally suitable for the large one.

Management of Cordons.—First of all, of course, the ground should be carefully selected and made suitable for cordons. Naturally this form of tree does best in light, warm, friable soil, but if the soil is heavy clay it must be made lighter and warmer by the addition of mortar rubble, or burnt earth, and careful attention paid to drainage. On such soils the trees should be planted near the surface, and the soil moulded up to them, leaving the trees on a mound above the surrounding soil.

On the other hand, in very hot light gravelly or sandy soils, cordon fruit trees require attention during dry weather in the way of mulching and an occasional heavy soaking of water. In other respects the same methods of planting, spraying, thinning of fruit, and general cultivation hold good as in other forms of dwarf fruit trees.

Single Cordons.—These are the best of all forms. They consist of a one-stem tree carrying a number of spurs on which are the blossom and fruit.

The trees should be planted 2 ft. apart at an angle of 45° in single rows sloping towards the south, and 5 ft. left between rows. Each tree should be supported by three or four wires strained from stout posts at each end of the row, and bamboo canes 6 ft. long should be tied to the wires at the same angle, the trees themselves being tied to the canes. As in all other forms very firm planting is essential for success.

Pruning consists of shortening each shoot (except the terminal or leading shoot) in late August or September to four or five leaves, cutting this again back in the winter to three eyes or a fruit bud. The *Lorette System of Pruning* is, however, more elaborate and quite ideal for cordons. This consists of pinching the young side shoots in June to six leaves; again pinching all growths from these shortened shoots in July; then in August cutting back to the "basal" buds of the young shoots from which will emerge a *dard* (immature fruit bud), or a fully matured fruit bud, thus hastening the appearance of fruit buds by a year or two. The "basal" buds are situated a quarter of an inch beyond the previous year's wood, *i.e.* in the first quarter of an inch of the current summer's growth.

The leading (terminal or extension) shoot of cordon fruit trees seldom requires shortening at any time, the angle at which it grows causing it to produce side-shoots along its entire length. As the trees grow longer they should be pulled down to a sharper angle, maintaining the total height of the row at about 6 ft., at the same time keeping each tree in the row at an equal distance from its neighbour.

Ties must be examined and renewed before they cut into the shoots, and fruit must be reduced to suit the strength and growth of the trees. As a rule, if a foot of new growth be made by the middle of June, the trees are not carrying more fruit than they can properly mature.

Over-cropping in any one year generally means little or no fruit the next; thus a moderate crop annually is the ideal.

What to Grow.—All varieties of Apples that "spur" well are suitable for this form, the few exceptions being the varieties that produce most of their fruit on the ends of short branches, such as *Irish Peach* and *Mr Gladstone. Lady Sudeley* and *Worcester Pearmain* require the leading shoots shortened about halfway each winter, as they do not produce side-shoots so freely as most varieties.

All Pears (except *Jargonelle*) succeed admirably as cordons, and this form is quite the best way of growing pears.

Plums, too, may be grown as cordons, but must not be side-pruned so closely, as they fruit mostly on short young branches. Rows of cordon plums more resemble a hedge, and really this fruit is more profitable grown as bushes and standards.

Cherries are also best grown as standards or bushes, as they are liable to resent the hard pruning necessary to keep to the cordon form. However, if this is done to cherries before the leaves drop, preferably in August, they will stand the hard pruning much better. They spur well on the old wood, but if pruned when dormant sometimes exude gum and become unhealthy. The *Morello* is the only variety that cannot properly be grown in cordon form. The Black Currant cannot be grown in this manner, for the same reason.

Manures for Cordons.—The use of highly nitrogenous manures is not recommended for cordons unless there is danger of exhaustion, such as is the case if they are carrying a very exceptionally heavy crop, or are approaching old age. An annual dressing of some bulky manure lightly dug in during the autumn, and followed by sowings of phosphates such as bone-flour, in the spring, should be sufficient.

In the event of trees producing too much wood at the expense of fruit, due as a rule to over-manuring, they may be root-pruned in November in the manner described in our article on *Root Pruning.* This operation is seldom necessary if over-manuring be avoided, and if the trees are grafted upon the proper stocks for cordons. Care should be exercised when purchasing trees that the stocks used are English Paradise for apples, and Angers Quince for pears.

One word of warning may be profitably added. Owing to the small space occupied by this form of fruit tree, the amateur is often liable to plant too near ornamental and larger trees whose roots rob the ground which should be the property of the fruit trees and whose shade robs them of their proper share of sunlight. Apples, especially, require space and air, and more importance should be attached to their requirements in this way than is usually done. Although, of course, the distance varies somewhat according to circumstances, the cordons should not be planted less than 30 ft. away from the subjects just named.

Cordons on Walls.—Apples should never be grown as cordons on walls south of the Midlands, but may be very profitably so grown as such in the North. Cordon pears succeed admirably on south, south-east, and south-west walls in all parts of the kingdom. If the walls are high, such as those of houses or out-buildings, the cordons may be planted upright and a little closer together; the leading shoots should, in this case, be cut half-way back each winter in order to ensure side-growths. Cherries and Plums are best fan-trained on walls. Cordon Red and White Currants as well as Gooseberries are often planted on north walls to prolong their season, and south walls to advance their earliness. The general treatment is similar to that described for apples and pears.

Other Cordons.—Other forms or, rather, elaborated forms are *double* and *treble, diagonal* or *upright cordons,* which consist of two or three stems being taken up instead of one as is the case with the single cordon previously dealt with. These forms are not nearly so desirable, as in most cases one of the stems obtains the mastery at the expense of the other or others, and it requires very skilful manipulation to maintain the balance of strength. Pinching in summer the growing points of the stronger stems is the best method of control, and often requires doing several times.

Again, a form known as the *double horizontal cordon* is often used as edgings and consists of a double-shooted cordon, trained T shape, the top of the T being allowed to extend in both directions as far as space permits. This form may be called an espalier of one tier, but this tier is grown parallel with, and 1 ft. above, the ground. It is quite satisfactory, except that the difficulty of symmetrical control occurs as in the case of the last-mentioned types.

Again, there are the *Palmettes,* much grown in France, which are cordons of four or five diagonal stems; also the *grid-iron cordon,* with four or five upright stems all emanating from one horizontal base. These are elaborations of the double horizontal cordon above referred to, and the more elaborated the tree, the greater is the skill required to preserve balance and symmetry. Other elaborated designs may be evolved on similar lines according to the fancy of the grower, but, as above mentioned, the most practical and profitable form, the easiest to train, and from which amateurs can produce the best results, is the single diagonal cordon.—W. P. S.

CORDONS: PRUNING OF.—See *PRUNING FRUIT TREES.*

CORDONS ON WALLS.—See *CORDON FRUIT TREES.*

COREAN PINE (*Pinus koraiensis*).—See *TREES.*

COREOPSIS (TICKSEED. Nat. Ord. Compositæ).—The ANNUAL SPECIES of this genus are slender plants, and though they often need a little support such as a few foot-high twigs afford, they are free flowering, elegant subjects, suitable alike for the border or for the reserve garden where plants are grown for the production of flowers for cutting. Rich brown and golden-yellow are the predominating colours. Although hardy in the southern counties, an autumn sowing cannot always be depended upon, unless the soil is light and well drained. Fine plants result from a March or early April sowing made in drills from whence the seedlings should be transferred to their flowering quarters when about 3 ins. high. A popular method of raising them is to treat them as half-hardy annuals and sow seeds in heat in February. The following are the most useful species :—

Coreopsis aristosa.—A yellow autumn flowering sort growing 2½ ft. high.

C. atkinsoniana (Syn. *Calliopsis atkinsoniana*).—A yellow sort with a brown centre, blooming throughout the summer, and growing 3 ft. high.

C. cardaminefolia.—A yellow and purple-brown summer flowering sort growing 2 ft. high. The dwarf form *C. c. nana* is very useful for edging, as it only grows 9–12 ins. in height.

C. coronata.—A yellow and crimson-brown, summer flowering, Texan sort, growing about 2 ft. high.

C. Drummondii (Syn. *C. diversifolia*).—A crimson and yellow summer flowering sort, making a very handsome garden plant. It grows 2 ft. high.

C. tinctoria.—A brown and yellow sort flowering all through the summer. Its variety *atropurpurea* is a handsome garden plant. Both have given many interesting and beautiful forms, some of which are quite dwarf, rarely more than 1 ft. high, with crimson-brown or yellow-brown flowers. A comparatively new race has starry blooms and is known as *Cactus-flowered*; *Golden Crown* is dwarf yellow and orange; while *Lemon Queen*, taller, is possibly a form of *C. Drummondii.* There is also a double or semi-double form with yellow and brown flowers.

Perennial Border Species.—These are useful hardy herbaceous plants for the border and shrub border. They succeed in ordinary garden soil in a sunny site, and may be propagated in the usual way by seeds sown in the summer, or division of the roots in the autumn or spring, at which times they may also be successfully planted. Quite a number of species have been described; of these we recommend the following, most of which are useful for cutting :—

Coreopsis auriculata.—This bears yellowish flowers in June and July, and grows 4–6 ft. high.

C. delphinifolia.—This yellow sort blooms in July and August, and grows 1 yd. high.

C. grandiflora.—This also is yellow, and blooms in August and

September. It grows about 3 ft. high.

C. lanceolata.—This is a biennial or short-lived perennial, producing yellow flowers in August and growing 1 yd. high.

C. latifolia.—This is similar to the above, but perennial.

C. rosea.—This is a pretty sort bearing red flowers in July and August, and growing 1½ ft. high.

C. senifolia.—This bears yellow flowers in August and September, and averages 3–4½ ft. high.

C. trichosperma (Syn. *C. aurea*).—This is a biennial or short-lived perennial, bearing yellow flowers in August and September, and growing about 1 yd. high.

C. tripteris (GOLDEN CROWN).—This is a useful tall-growing sort for the back of borders, shrubbery margins, etc. It produces yellow flowers in August and September, and often grows 6 ft. high.

C. verticillata.—This is a slender grower bearing pretty yellow flowers from July to August, on plants about 12 ins. high.

CORFU LILY (*Funkia subcordata*).—See *FUNKIA*.

CORIANDER.—See *CORIANDRUM* and *MEDICINAL HERBS*.

CORIANDRUM (Nat. Ord. Umbelliferæ).—See notes on CORIANDER in article on *MEDICINAL HERBS*.

CORK-BARKED ELM.—(*Ulmus campestris suberosa*).—See *TREES*.

CORK OAK (*Quercus Suber*).—See *TREES*.

CORKY SCAB.—See *POTATO DISEASES*.

CORN ADONIS (*Adonis autumnalis*).—See *ADONIS*.

CORN FLAG.—A popular name for *GLADIOLUS*.

CORN MARIGOLDS.—See *CHRYSANTHEMUM : ANNUAL SPECIES*.

CORN MINT (*Mentha arvensis*).—See *MENTHA*.

CORN SALAD.—See *SALAD PLANTS* and *VALERIANELLA*.

CORN SPURGE (*Euphorbia segetalis*). See *EUPHORBIA*.

CORN THISTLE (*Carduus arvensis*, or *Cnicus arvensis*).—See *CARDUUS* and *CNICUS*.

CORN VIOLET.—See *VENUS'S LOOKING GLASS*.

CORNEL (*Cornus Mas*).—See *SHRUBS*.

CORNELIAN CHERRY (*Cornus Mas*). See *SHRUBS*.

CORNFIELD SNAPDRAGON (*Antirrhinum Orontium*).—See footnote to *ANTIRRHINUM*.

CORNFLOWER (*Centaurea Cyanus*. Nat. Ord. Compositæ).—The Cornflower is a British plant, and often found growing rather plentifully in cornfields; it has other common names such as BLUE-BOTTLE and BLUET. In good soil it will grow 3 ft. high; of slender habit and with small leaves, it carries bright blue flowers. The type has been improved under cultivation; white, pink, rose, pale blue, and deep blue varieties are obtainable, and these come true from seed. There is also a group of dwarfer varieties grown under the title of *Cyanus minor*, and which rarely exceed a height of 12 ins.; *Emperor William* is one of the best of the blue forms. A still dwarfer selection is catalogued as *Cyanus nana compacta*, or as the Victoria strain; these grow 9 ins. high, and there are rose and blue varieties. *Centaurea depressa*—known as KING OF THE BLUE-BOTTLES—is like a dwarf Cornflower with a more spreading habit; its large blue flowers are crimson centred; 1 ft. high. Cornflowers are easy to grow, and their culture is in every respect similar to the general culture of annuals given in our article *ANNUALS FOR ALL PURPOSES*.—C. H. C.

See also *MEDICINAL HERBS*.

CORNISH ELM (*Ulmus glabra cornubiensis*).—See *TREES*.

CORNISH HEATH (*Erica vagans*).—See *HEATHS* and *SHRUBS*.

CORNISH POLYPODY (*Polypodium vulgare cornubiense*).—See *FERNS AND FERN GARDENING.*

CORNUS.—For the best species see *SHRUBS* and *CLIMBING AND TRAILING PLANTS.*

COROKEA.—For the best species see *SHRUBS.*

CORONILLA (CROWN VETCH. Nat. Ord. Leguminosæ).—This is a genus of handsome free flowering greenhouse plants of easy culture, and herbaceous plants suitable for the rock garden. There are also shrubby and creeping species, which it would be beyond the scope of the present work to describe. The greenhouse species may be easily propagated by inserting cuttings under a hand-light or bell-glass during the summer months, very little heat being required. A suitable soil for both cuttings and established plants is two-thirds peat, one-third loam, and plenty of silver sand. Temperature required, 40–50° F. The two best sorts are :—

Coronilla glauca.—Fragrant yellow. Flowers from June to July. Height, 2 ft.

C. glauca variegata.—Yellow. Flowers from June to July. Height, 2 ft.

Rock Garden Species.—The three described below are attractive and bear pea-shaped flowers. They thrive in loamy soil, and are easily propagated by the division of the roots in the autumn, or by seeds which germinate freely if sown in gentle heat in March.

Coronilla cappadocica (Syn. *C. iberica*).—This has prostrate stems well clothed with leaves. Flowers bright yellow. Site sunny. Soil deep loam. Flowering Period, June to July. Height, 3 ins.

C. minima.—This is a very dwarf species. Flowers yellow. Site sunny. Soil deep loam. Flowering Period, June to July. Height, 2 ins.

C. varia.—This forms a bushy plant, the juice of which is poisonous. Flowers bright rose. Site sunny. Soil ordinary loam. Flowering Period, June to July. Height, 18 ins.

See also *SHRUBS.*

CORONOPUS.—Now included in the genus *SENEBIERA.*

CORROSIVE SUBLIMATE.—See MERCURIC CHLORIDE in *MERCURY COMPOUNDS.*

CORSICAN HEATH (*Erica stricta*).—See *HEATHS.*

CORSICAN PINE (*Pinus Laricio*).—See *TREES.*

CORSTORPHINE PLANE (*Acer Pseudoplatanus flavo-marginatum*).—See *TREES.*

CORTADERIA (Nat. Ord. Gramineæ).—This is the new name for the genus *GYNERIUM*, on which a separate note appears elsewhere. The best species is *C. argentea* (Syn. *G. argenteum*), the well-known PAMPAS GRASS. This is described under *G. argenteum* in our article on *ORNAMENTAL GRASSES.* A species not previously included in Gynerium, as far as we know, is *C. conspicua*, the SILVERY REED-GRASS, a very useful species for the wild garden.

CORTUSA (BEAR'S-EAR SANICLE. Nat. Ord. Primulaceæ).—These are interesting plants of the Primula family. They thrive in shady positions in deep rich soil in the rock garden, and are propagated by division of the roots in autumn or spring and by seed in spring. Only one species is worth growing.

C. Matthioli.—Leaves rounded in rosettes. Flowers purple in drooping umbels. Site half-shade. Soil sandy leaf-soil. Flowering Period, May to June. Height, 9 ins.

CORYANTHES.—See *ORCHIDS.*

CORYDALIS (FUMITORY. Nat. Ord. Papaveraceæ).—A useful genus of hardy annual, perennial border, and rock plants. With the annuals we need not trouble here. The border sorts like shaded sites, and are not hard to propagate by division in the usual way in the autumn or spring. They may also be raised from seeds in the manner described in our general article on *PERENNIALS*.

Perennial Border Species.—Only a few of the many can be described here :—

Corydalis angustifolia.—A purple March blooming sort about 12 ins. high.

C. bulbosa.—A synonym of *C. solida*, which see.

C. Cava.—A synonym of *C. tuberosa*, which see.

C. cheilanthifolia. — A popular yellow sort blooming from May to July, and averaging 12 ins. high.

C. Marschalliana. — A purple February flowering sort about 12 ins. high.

C. pallida.—A useful yellow March blooming sort growing about 1½ ft. high.

C. pauciflora.—A similar sort in all its characters to *C. Marschalliana.*

C. Semenowii.—A bright yellow sort blooming in March and April. The height averages 1½ ft.

C. solida (Syn. *C. bulbosa*).—A pink sort blooming in February and March. Its average height is 12 ins.

C. tuberosa (Syn. *C. Cava*).—This can be had in purple and pure white. It is a desirable sort flowering from February to May, and averages 12 ins. high.

Rock Garden Species.—The five described below are splendid, and are propagated by division of roots in autumn or spring :—

Corydalis bracteata.—Leaves deeply divided. Flowers sulphur-yellow. Site, half-shade. Soil deep well-drained loam. Flowering Period, May to June. Height, 6 ins.

C. capnoides.—A bushy plant. Flowers creamy-yellow. Site, half-shade. Soil rocky, or old walls. Flowering Period, May to October. Height, 12 ins.

C. lutea (YELLOW FUMITORY).—A bushy plant with deeply divided leaves. Flowers clear yellow. Site, half-shade. Soil rocky, or old walls. Flowering Period, May to October. Height, 12 ins.

C. nobilis.—A handsome bushy species. Flowers golden-yellow, with dark centre in dense heads. Site, half-shade. Soil deep sandy loam. Flowering Period, May to June. Height, 9 ins.

C. thalictrifolia.—A plant with much divided elegant foliage. Flowers clear yellow in long racemes. Site, half-shade and sheltered. Soil well drained and gritty. Flowering Period, May to September. Height, 9 ins.

CORYLOPSIS.—For the best species see *CLIMBING AND TRAILING PLANTS* and *SHRUBS*.

CORYLUS.—For the best species see *TREES*.

CORYPHA.—See LIVISTONA in *PALMS*.

COS LETTUCE.—See *LETTUCE*.

COSMOS.—See *ANNUALS, HALF-HARDY : LIST OF*, and *PERENNIALS, HALF-HARDY : LIST OF*.

COSSUS.—See GOAT MOTH in *INSECT PESTS*.

COTA.—Now included in the genus *ANTHEMIS*.

COTONEASTER.—For the best species see *CLIMBING AND TRAILING PLANTS* and *SHRUBS*.

COTTAGE GARDENS.—Our remarks on *VILLA GARDENING* apply equally to these.

COTTAGE TULIPS.—See under VARIETIES in *TULIPS*.

COTTAGER'S KALE.—See *BORECOLE or KALE*.

COTTON THISTLE.—See *ONOPORDON*.

COTTON WEED (*Diotis*. Nat. Ord. Compositæ).—This moorland plant is sometimes grown in the more peaty portions of the wild garden, but as it is of very little value we do not recommend it being troubled with.

COTTONWOOD (*Populus deltoidea*).—See *TREES*.

COTYLEDON (PENNYWORT.[1] Nat. Ord. Crassulaceæ).—A genus of succulent plants, growing well in dry positions in the rock garden. They are propagated by division in autumn or spring, or by seeds in heat in spring.

C. chrysanthus.[2]—Leaves hairy in rosettes, forming masses. Flowers cream coloured, in corymbs. Site open and sunny. Soil gritty. Flowering Period, June to July. Height, 6 ins.

C. Pestalozzae.—Leaves in rosettes. Flowers pink. Site sunny. Soil gritty. Flowering Period, June to October. Height, 6 ins.

NEW VARIETY.

Cotyledon simplicifolia.—This is a pretty hardy sort, with leathery leaves and yellow flowers in drooping racemes.

COTYLEDONS.—See under LIFE-HISTORY OF FLOWERING PLANTS in *PLANT PHYSIOLOGY*.

COUCH GRASS.—A persistent perennial weed. See *AGROPYRON*. For MEANS OF CONTROL see *WEEDS*.

COUVE TRONCHUDA or **Portugal Cabbage** (*Brassica oleracea costata*. Nat. Ord. Cruciferæ).—This is quite distinct from the ordinary cabbage, and less able to withstand severe frost. It forms a most delicious winter and early spring vegetable. The green portion of the large leaves is far sweeter to the taste than even the best among ordinary cabbage, and the stout stems of these leaves make a really good substitute for Seakale.

Culture.—Sow in the open garden in early spring and treat as advised in article on *BROCCOLI*.—F. R. C.

COW MANURE.

Undoubtedly cow manure is, if properly managed, a valuable manure for many garden purposes, especially where the soil is very light, but its sticky nature and its effect on the stronger soils deters it being used as much as horse manure. Fresh green cow manure is but little used save for making liquid manure, and for deeply digging into very hungry soils; it is a very heavy material and, though consisting largely of humus, contains very little plant food. As a rule in its fresh state it is useless for mulching on account of the fact that a hard skin sets on the surface in hot weather.

Cow Dung Stacks.—Travelling up and down the country it is rare that one sees a proper stack of cow dung. Usually the material is thrown together in a loose heap just as it is wheeled away from the winter cow byres. Pools of water are seen round the heap, soaking away to waste, and the heap is in no way protected from the winter rains. It is not to be wondered at that the resulting material is mild—too mild very often for general garden manuring—as the plant food has been washed out.

The ideal method is to choose a site for the heap protected by a wall from the prevailing winds, and to put down a sloping base of flags or, better still, concrete with a drain at the two lowest corners. This drain should not lead into a sewer, but into a sump or tub from which the rich green or black liquid can be frequently pumped up. The heap itself should be built in the shape of a span-roofed glass-house and the dung made as firm as possible. One or two holes should be left in the top for the liquid drainings to be pumped into, and the rest of the heap should be covered with soil or with boards to protect it from the weather. After about six weeks of rotting in this manner, the material may be used, more especially for vegetables, but the longer it rots the better it will be. After about six months of this treatment a beautifully mild but very rich material will be obtained for use as a top-dressing to or a manure for flower-beds, roses, and so on. It then proves a valuable cooling mulch for fruit trees. It can be used at the rate of 3–5 cwt. per sq. rod, the smaller quantity being for mulching and the larger for digging in.

---

[1] Or NAVELWORT of some authorities—EDITOR.

[2] The HOUSELEEK PENNYWORT.—EDITOR.

Potting Dung.—Gardeners often require cow manure to add to their potting soils, and while fairly fresh material can be used for such gross feeders as tomatoes, generally speaking the older the material is the better. That which has been allowed to rot in a protected heap for twelve to eighteen months will prove the most suitable, and it is far better to make arrangements to keep the manure for that period than to have to purchase it and pay the top price asked for it over a nurseryman's counter.

Sawdust Manure.—The difficulty of obtaining straw has compelled many cow-keepers to bed their beasts on sawdust, and consequently a mixture of sawdust and dung is often sold to gardeners for manure. This material should be avoided; it is all very well for the fields, but brings trouble in its track if used in the garden. On account of the sloppy nature of cow dung it is quite impossible to arrange to keep the droppings separate from the sawdust, as they always absorb a quantity of it. Where the material has to be used, however, it should be very old indeed, not less than twelve months at any rate, and better still two years. Lime should be freely used on the land and the material applied sparingly, certainly at no greater rate than 3 cwt. per sq. rod.

Cow manure will have to come into more general use on account of the reduction in horse traffic due to increased motor traction, thus gardeners should understand its limitations. It may be well to add for the sake of beginners that where cow dung is used for liquid manuring, the first water poured over the bag of dung in the liquid manure barrel should be boiling water, in order to kill the numerous pests it contains.—E.

COW PARSNIP.—See *HERACLEUM.*

COWBERRY (*Vaccinium Vitis-idaea*). See *SHRUBS.*

COWSLIP (*Primula officinalis*).—See *PRIMULA.*

CRAB APPLE.—For the best sorts see PYRUS in *TREES.*

CRAB GRASS.—See *ELEUSINE.*

CRACCA.—Now included in the genus *VICIA.*

CRACK WILLOW (*Salix fragilis*).—See *TREES.*

CRAESIA.—See under ROSE GRUBS in *INSECT PESTS.*

CRAMBE (KALE. Nat. Ord. Cruciferæ).—This is a genus of hardy herbaceous or tuberous perennials of easy culture, but not of great value for garden decoration. The best for this purpose is *C. cordifolia* (Syn. *C. kotschyana*), a white May flowering plant about 4 ft. in height. *C. pinnatifida* (Syn. *C. orientalis* of some authorities) is rather similar. *C. maritima* is the well-known vegetable *SEAKALE*, on which a separate article is given. The SPANISH KALE (*C. hispanica*), may also be grown and used in the same way. The roots of *C. Tataria* are used as a vegetable abroad, but not in this country.

CRANBERRY.—The genus Oxycoccus and *O. palustris*. See *SHRUBS*.

CRANE FLIES.—See *INSECT PESTS*.

CRANES-BILL.—A popular name for the perennial border Geraniums. See *GERANIUM*.

CRASPEDARIA.—Now included in the genus POLYPODIUM for which see *FERNS AND FERN GARDENING*.

CRATAEGUS.—For the best species see *CLIMBING AND TRAILING PLANTS* and *TREES*.

CREEPING BUTTERCUP.—A perennial Weed. For MEANS OF CONTROL see *WEEDS*.

CREEPING CROWFOOT (*Ranunculus repens*).—See note at end of *RANUNCULUS*.

CREEPING FORGET-ME-NOT (*Omphalodes verna*).—See *OMPHALODES*.

CREEPING JENNY (*Lysimachia Nummularia*).—See *LYSIMACHIA*, also *WATER GARDEN: PLANTS FOR THE*.

CREEPING THISTLE.—A perennial Weed. See *CNICUS*. For MEANS OF CONTROL see *WEEDS*.

CREEPING WINTERGREEN (*Gaultheria procumbens*).—See *GAULTHERIA* and *SHRUBS*.

CREOSOTE.—See *WOOD PRESERVATIVES*.

CRESS.

This is a name applied to an enormous number of garden plants. The following is a list of the most important, the authorities for the names being those at Kew:—AMERICAN CRESS (*Barbarea praecox*); BITTER CRESS (*Cardamine amara*); PENNY CRESS (*Thlaspi arvense*); PEPPER CRESS (*Teesdalia nudicaulis*); PURPLE ROCK-CRESS (*Aubrietia deltoidea*, and other species); ROCK-CRESS (the genus *Arabis*); WALL CRESS (*Arabis albida*); WART CRESS (the genus *Senebiera*); WATERCRESS (*Nasturtium officinale*); WHITLOW CRESS (*Lepidium Draba*); and WINTER CRESS (*Barbarea officinalis*). Most of these are referred to in their proper places under the common or botanical names. The salading crop known merely as CRESS, always grown with another salading crop, MUSTARD, and the WATERCRESS are dealt with in our article on *SALAD PLANTS*.

CRESS: Common and Water.—See MUSTARD AND CRESS and WATERCRESS in *SALAD PLANTS*, and see also *LEPIDIUM*.

CRESTED HAIR GRASS.—See *KOELERIA*.

CRETAN MULLEIN (*Celsia cretica*: Nat. Ord. Scrophulariaceæ).—This is one of about thirty species in a genus of hardy and half-hardy biennials or perennials, bearing yellow, purple, or red flowers, on long spikes. They are distinguished from Verbascum by having only four stamens, the latter having five.

Culture.—This is quite simple. Sow the seeds on a well-prepared bed in the open, in June, and thin out to 2 ft. apart, or sow in a bed and transplant into the permanent positions when a few rough leaves have been made. *Celsia cretica*, with its yellow flowers, is also very handsome for the greenhouse, when grown in pots. Where the soil is very heavy it should be wintered in a cold frame and planted out in spring. Out of doors the plants flower in June, and vary from 2 ft. to 6 ft. in height.

CRETAN SPIKENARD (*Valeriana Phu*).—See *VALERIANA*.

CRICKET BAT WILLOW (*Salix alba caerulea*).—See *TREES*.

CRIMEAN SNOWDROP (*Galanthus plicatus*).—See *SNOWDROP*.

CRIMSON CHINA ROSE (*Rosa indica sanguinea*).—See *ROSE SPECIES*.

CRIMSON CLOVER (*Trifolium incarnatum*).—See *TRIFOLIUM*.

CRIMSON FLAG.—See *KAFFIR LILY*.

CRIMSON LEAF.—See *SHORTIA*.

CRIMSON PINK (*Dianthus atrorubens*). See *DIANTHUS*.

CRIMSON SATIN FLOWER (*Brevoortia Ida-Maia*). See *BREVOORTIA*.

CRINUM (CAPE LILY. Nat. Ord. Amaryllidaceæ).—This is a valuable addition to bulbous flowering plants for the greenhouse, with stems 2–3 ft. high, producing eight to twelve blooms. It requires rich loam, peat, and sand, and is propagated by offsets and seed in spring. Temperature needed, 45–55° F.

Greenhouse Species. — *Crinum cruentum.*—Pink. Flowers in July. Height, 2–3 ft.

C. longifolium.—Rosy red. Flowers in July. Height, 2–3 ft. This may also be grown out of doors in a sheltered herbaceous border.

C. Macowani.—White, tinged red. Flowers in January. Height, 2–3 ft.

C. Moorei.—Rose. Flowers in March and September. Height, 2–3 ft.

C. Powellii.—Rosy white. Flowers in July. Height, 2–4 ft. Its variety *album* has white flowers.

CRIOCERIO.—See ASPARAGUS BEETLE in *INSECT PESTS.*

CRITHMUM MARITIMUM.—See *SAMPHIRE.*

CROCUS (Nat. Ord. Iridaceæ).

History.—The Crocus family is a large one, and has been known in one part of the world or another from the earliest times of which we have any historical record. Crocus colour or saffron was the imperial colour of ancient Chinese civilisation. The rich glow of a mass of the ordinary garden yellow crocus attracted poor Forbes Watson, for in one of his exceptionally charming essays he writes: "The Yellow Crocus is a perfect flower, leaving nothing that we could wish to add to or alter" (*Flowers and Gardens*, page 33, first edition). This large yellow variety (along with the large purple, the striped, and the white) is alone thought of by many people when they think of a Crocus. These so-called Dutch or Florists' Crocuses, however, by no means represent anything like the whole family. There are numerous species, which, although as a rule they have smaller and more delicate-looking blooms, are even more beautiful as individuals, and are by no means to be despised for the show many of them are capable of making when massed together. Moreover, some of them begin to flower in the autumn, from which time there is an orderly succession of flowers until the last whites of the Dutch varieties finish the season. These species are now coming very much to the front, and already there are, for example, hybrids of *Crocus chrysanthus* on the market, *e.g. E. A. Bowles*, *Siskin*, and *Yellow Hammer*. As most Crocuses seed freely, the production of new varieties by cross fertilisation and selection offers a most interesting hobby to anyone who can give a little time and attention to them.

Culture.—Any good fairly light garden soil suits the Crocus. It is obvious that the autumn and winter flowering varieties must be planted in June or July, and that warm, sheltered nooks should be chosen if they are to be seen at their best. Failing this, they should have the protection of a cold frame. Two or three frames 6 ft. by 4 ft., with autumn and winter species of Crocus planted out in them, afford almost constant bloom all through the darkest days of the year, if the selection is well made. Some of the early spring flowering species, such as *Crocus Sieberi*, do very well in pots, if grown from start to finish with a minimum of heat and plenty of air. *Dorothea*, a Dutch variety, is also exceptionally good as a pot plant.

Species and Varieties.—These may be divided into (1) Dutch or Florists' Varieties; and (2) Species and Species Varieties, or Hybrids. The height of all Crocuses rarely exceeds 6 ins.

DUTCH VARIETIES: *Mauve.*—Dorothea.

Purple.—Cæsar, Hero, and *purpurea grandiflora.*

Striped.—Edina, Margot, Mikado, Sir W. Scott.

White.—Kathleen Parlow, May, Mt Blanc, White Lady.

Yellow.—There is only one yellow called the Yellow Dutch. This never seeds, hence all propagation must be by increase of the corms.

SPECIES AND HYBRIDS: AUTUMN-FLOWERING:—*Crocus asturicus.*—Purple.

C. longiflorus (Syn. *C. odorus*).—Soft lilac, deeper feathering at base of flower.

C. pulchellus.—Lavender.

C. sativus (SAFFRON CROCUS).—Purple-lilac.

C. speciosus.—Blue-purple. *Aitchisonii* is a much improved subvariety.

C. zonatus.—Rosy-lilac, with a yellow and orange zone in the centre and tube.

SPRING-FLOWERING:—*Crocus aureus.*—Golden-yellow.

C. biflorus.—White - feathered violet.

C. chrysanthus.—Shades of yellow, but varies a good deal.

C. Imperati.—Purple, outside fawn.

C. tommasinianus.—Lavender.

C. Sieberi.—Bluey-lilac.

C. susianus.—Deep yellow or dark orange, with brown flames on the exterior.—J. J. & E.

CROCUS, AUTUMN, and CROCUS, SAFFRON.—See *COLCHICUM*, also under CROCUS in *MEDICINAL HERBS.*

CROP REQUIREMENTS.—See *MANURES.*

CROPPING.—See *ROTATION OF CROPS AND DOUBLE CROPPING.*

CROPPING GROUPS.—See *ROTATION OF CROPS AND DOUBLE CROPPING.*

CROPPING RULES.—See *ROTATION OF CROPS AND DOUBLE CROPPING.*

CROPS BENEFITED BY SEAWEED.—See *SEAWEED AS MANURE.*

CROSNES.—A synonymous name for *CHINESE ARTICHOKES*, which see.

CROSS-BREEDING.—See *HYBRIDISING AND CROSS-BREEDING.*

CROSS-LEAVED HEATH (*Erica Tetralix*).—See *HEATHS* and *SHRUBS.*

CROSSWORT BEDSTRAW (*Galium Cruciata*).—See *GALIUM.*

CROWFOOT.—See *WATER GARDEN: PLANTS FOR THE.*

CROWN DAISIES.—See *CHRYSANTHEMUM: ANNUAL SPECIES.*

CROWN GALL.—See *DISEASES OF PLANTS.*

CROWN GRAFTING.—See GRAFTING in *PROPAGATION OF PLANTS.*

CROWN IMPERIAL (*Fritillaria Imperialis.* Nat. Ord. Liliaceæ).—This is a member of the Fritillary family, and has been an inhabitant of British gardens for a very long time. It is a native of Persia, and seems to have come to us *via* Vienna. Well-cultivated specimens grow about 3 ft. in height. The leafy tuft at the top of the stem, with the circle of large pendulous flowers immediately beneath it, are features well known to all gardeners. Parts of the plant have an unpleasant smell, hence the name of STINK LILIES.

Culture.—Crown Imperials like a rather stiff, rich loam, and semi-shade. Bulbs should be planted 6 ins. deep, and for a good effect, in clumps of four to eight, each one 8 ins. from its neighbour. An annual top-dressing of old manure and leaf-mould is of great benefit, as they dislike root disturbance, and should not be moved more than once in every five years.

Varieties.—There are not many of these, but in any case the double sorts are not recommended.

Fritillaria Imperialis.—This is a splendid red sort, flowering in May, and averaging about 3½ ft. in height.

Varieties of it are *maxima lutea* (yellow), and *maxima rubra* (red).

There are a few named forms, such as *Aurora* (orange-red); *Orange Brilliant* (orange and buff); and *Red Crown-Upon-Crown* (red, with two or more whorls of flowers). All these varieties of the Crown Imperials bloom in May, and grow about 3 ft. high.—J. J. & E.

CROWN VETCH.—See *CORONILLA.*

CROWNED CAMPION (*Lychnis coronaria*).—See *LYCHNIS.*

CRUCIANELLA.—See *PHUOPSIS.*

CRUCIFER MIDGE.—See *INSECT PESTS.*

CRYPTOCERAS.—Now included in the genus *CORYDALIS.*

CRYPTOCOCCUS.—See FELTED BEECH COCCUS in *INSECT PESTS.*

CRYPTOGRAMME. — For the best species see *FERNS AND FERN GARDENING.*

CRYPTOMERIA.—For the best species see *TREES.*

CUBICAL CONTENTS OF GREENHOUSES.—See under VOLUMES in *ARITHMETIC AND GARDENING.*

CUCKOO GRASS (*Luzula campestris*). See *LUZULA.*

CUCKOO SPIT.—See *INSECT PESTS.*

CUCUMBER CANKER.—See under TOMATO CANKER in *TOMATO DISEASES.*

CUCUMBER FRAMES.—See *GREENHOUSES AND FRAMES.*

CUCUMBER LEAF BLOTCH DISEASES.—See *DISEASES OF PLANTS.*

CUCUMBER AND TOMATO HOUSES. See *GREENHOUSES AND FRAMES.*

CUCUMBER TREE (*Magnolia acuminata*).—See *TREES.*

CUCUMBERS (Frame).

These require a bed made up as mentioned under *MELON*, one plant to a light 6 by 4 ft. will be found sufficient. Stop and train the shoots as recommended, removing surplus shoots; a regular supply of fruit is what is required. Periodical attention is needed in regard to stopping and thinning of the shoots or they soon become crowded. Night temperature may be increased to 70° F. or 75° F., with a rise of 10° or 15° during day. Increase the moisture supplied by syringing and damping.

Varieties.—Good reliable sorts are:—Every Day, Rochford Market, and Telegraph.—F. J.

CUCUMBERS: Indoor (*Cucumis sativus.* Nat. Ord. Cucurbitaceæ).—The cultivation of the cucumber is important in every garden, and though comparatively easy to grow during the summer months, much care and attention is necessary to keep up a regular supply throughout the winter months. For this purpose, light, heat, moisture, and rich compost are needed, with a low span-roofed pit or lean-to house. Bottom heat-pipes are the best for winter supplies; these can be regulated and kept as near 75° F. as possible. A little ventilation may be given at the top of the house on fine days. The night temperature must not fall below 60° F., or the day temperature below 70° F. Even with bottom heat-pipes, a bed of manure should be made up and the compost placed on top; this assists the maintenance of warmth and natural moisture. Two parts loam, with one of leaf-mould, with rich top-dressings of loam, and a little rotten manure as the plants gain strength, will be found suitable. Sow the seeds as recommended for melons, and set out the plants on mounds of compost about 4 ft. apart avoiding over-cropping of the plants especially during the winter months. Tie up the plants loosely and pinch out the points when they have made about 3 ft. of growth; side-shoots may be stopped at two or three leaves, all other young shoots being treated similarly, until the roof is covered with fruit-bearing shoots.

Careful watering is necessary at first, but after the plants have filled the border with roots, light rich top-dressings are necessary, and more copious supplies of water as warmth and light increase.—F. J.

CUCUMBERS: Outdoor (*Cucumis sativus*. Nat. Ord. Cucurbitaceæ).—In addition to the varieties of cucumbers useful only for cultivating in heated houses or garden frames, there are two others quite distinct in appearance and manner of growth which in favourable seasons may be depended upon to give very satisfactory crops grown entirely in the open air. The best known of these are the *Ridge Cucumbers*, so largely grown for the London and other markets, and even though the latest additions to the varieties lack both size and appearance compared with others grown under glass, they are most useful in mixed salads, or for cultivation by those having no better means of obtaining home-grown supplies.

Culture.—If early fruit is desired seed should be sown in a greenhouse or sunny window early in April, and the plants put into open quarters during the first week in June. Such plants usually give very fine fruit by the middle of July, but for all ordinary purposes, the seed may be sown in the open air any time after the end of April.

A good plan to follow with these is to prepare a portion of ground by deep digging and manuring as early in the spring as possible, treading this fairly firm, and if dry giving a good watering just before sowing.

Draw out a drill 2 ins. deep with the corner of a hoe and press in a good plump seed every 2 ft. or so of the row (two or three seeds in each place will be better). Reduce where all seeds germinate to not less than 2 ft. apart, and during dry weather keep the plants well supplied with rain or soft water.

The fruits should be cut before they begin to show signs of turning yellow. If left uncut after this stage is reached, not only will they be of little table value, but their presence on the plant prevents the development of others.

Varieties.—The difference between the various varieties in this section is very considerable, the cream of these being found in:—King of the Ridge, Perfection Ridge, and Washington Ridge.

Japanese Cucumbers are a later introduction, but find much favour with cottagers. They produce fruit very early and in good numbers. Although these lack the size of the Ridge varieties the fact that they are more freely produced makes up for this.

Sow the seeds in a pan or bed early in April, but do not attempt planting out until all danger from frost is past.

Give each plant a few shovelfuls of well-rotted manure, burying this a foot below the surface, covering with any ordinary garden soil.

When planting always leave a slight depression in order that water may be freely given without waste. Provide each plant with a good stout pole or stick, and every evening following a warm day give the foliage a sprinkle overhead through a rosed watering can.

If, as usually is the case, the plants produce their fruit too freely for home consumption, do not be tempted to allow these to remain on after reaching a fair size, and on no account attempt to save seed until quite the end of the season, this being only possible at the expense of many fruits.—F. R. C.

CUCURBITA (Nat. Ord. Cucurbitaceæ).—This is a genus of useful half-hardy plants. *C. maxima* is the common PUMPKIN, so useful for pies, etc. *C. Pepo* is the GOURD, used similarly to the Vegetable Marrow and Pumpkin. See article on *PUMPKINS AND GOURDS*. *C. Pepo ovifera* is the VEGETABLE MARROW, a most useful vegetable, or is it a fruit? See article on *VEGETABLE MARROW*.

CUDWEED (*Gnaphalium*. Nat. Ord. Compositæ).—The Cudweeds would hardly be worthy of mention as useful hardy annuals were it not that many plant lovers have a weakness for "everlasting" flowers. The yellow flowers are closely placed in clusters; they appear in July, and are long-lasting when dried. The plants grow about 12 ins. high, and the best annual species is *G. obtusifolium*. See also article on *LEONTOPODIUM*.

CULINARY CROPS.—See *KINDS OF CROPS*.

CULINARY PEA.—See *PISUM*. See also *PEAS*.

CULTIVATORS.—See *GARDEN APPLIANCES*.

CULTURE OF GREENS.—See *GREENS: WINTER AND SUMMER*.

CULTURE SOLUTION.—See *PLANT PHYSIOLOGY*.

CUNNINGHAMIA.—For best species see *TREES*.

CUPHEA (Nat. Ord. Lythraceæ). This is an extensive genus of hardy annuals, stove annuals, stove evergreens, and half-hardy shrubs. As, however, there are many better things, we do not propose to describe any species here.

CUPRESSUS.—For the best species see *TREES*.

CUPRUM COMPOUNDS.—See *COPPER AND CUPRUM COMPOUNDS*.

CURATIVE PROPERTIES OF RESURRECTION PLANT.—See *RESURRECTION PLANT*.

CURRANT.—See *BUSH FRUITS*, also under RIBES in *SHRUBS*.

CURRANT CLEARWING.—See *INSECT PESTS*.

CURRANT AND GOOSEBERRY SAWFLIES.—See *INSECT PESTS*.

CURRANT LEAF SPOT.—See *DISEASES OF PLANTS*.

CUSCUTA (DODDER. Nat. Ord. Convolvulaceæ).—This is a genus of hardy plant parasites, bearing white sweet-smelling flowers. *C. Epilinum*, *C. Epithymum*, *C. europaea*, and *C. reflexa* are grown at Kew. These attain a length—it can hardly be called a height on parasitic plants—of about 12 ins. When plants are troubled by them, it is usually a sign of weakness and unhealthiness. The remedy is good culture and the use of mild stimulants.

CUSHION PINK.—See *ARMERIA* and *SILENE: ROCK GARDEN SPECIES*.

CUTTING: FLOWERS FOR.—See *FLOWERS FOR INDOOR DECORATION*.

CUTTING: FLOWERS UNSUITABLE FOR.—See *FLOWERS UNSUITABLE FOR CUTTING*.

CUTTING: ROCK PLANTS FOR.—See ROCK PLANTS FOR CUTTING in *ROCK PLANTS FOR ALL PURPOSES*.

CUTTING OF TREES: LAW AS TO. See *GARDENING LAW*.

CUTTINGS.—See CUTTINGS in *PROPAGATION OF PLANTS*.

CUTTINGS OF BEDDING PLANTS.—See *BEDDING PLANTS: CULTIVATION OF*.

CYANAMIDE.—See CALCIUM CYANAMIDE in *LIME COMPOUNDS*, and NITROLIM under NITROGENOUS MANURES in *MANURES*.

CYANANTHUS (Nat. Ord. Campanulaceæ).—A prostrate growing plant with numerous stems terminating with large flowers. It requires a moist but well-drained position in the rock garden, and is propagated by means of cuttings in July, by seeds in spring, or division in autumn. We recommend:—

C. lobatus.—Tufted and forming a mat. Flowers bluish - purple, large. Site shade. Soil sandy peat. Flowering Period, June to September. Height, 2 ins.

CYANIDE OF LIME.—See under CALCIUM CYANAMIDE in *LIME COMPOUNDS.*

CYANIDE OF POTASH.—See POTASSIUM CYANIDE in *POTASH AND POTASSIUM COMPOUNDS.*

CYANIDE OF SODA.—See SODIUM CYANIDE in *SODA AND SODIUM COMPOUNDS.*

CYANUS MINOR.—See *CORNFLOWER.*

CYCLAMEN (SOWBREAD. Nat. Ord. Primulaceæ). — Florists' section: greenhouse perennials. Height, 9–12 ins.

Soil. — Turfy loam, peat, and leaf-mould in about equal parts, with some rough silver sand. Propagate by sowing seeds in the autumn in pots or pans.

Culture.—Sandy loam, peat, and a little leaf-mould should be used till the seedlings are potted off individually. Cover the seeds lightly, keeping the soil shaded and uniformly moist till germination takes place. A temperature of 65° F. is suitable. As soon as the first rough leaf is formed, pot the young plants into "thumbs" and transfer later to 3-inch pots. About midsummer the final shift should be given into 5½- or 6-inch pots. At this stage a moist atmosphere is beneficial, and, if the weather is dry, syringing after sundown will greatly aid development. The plants will bloom from about mid-November till early in March. During the summer, shading from direct sun heat is essential, and as the flowering period approaches, it is desirable to give occasional doses of weak liquid manure; sheep manure giving, perhaps, the best results. A temperature of about 55–60° F. is required while the plants are in bloom. Greenfly and thrip are sometimes troublesome, but fumigation will keep the former in check, and the latter will not develop into a pest if the house is kept moist as advised.

Varieties.—Cherry Ripe, Crimson St George, Giant White, Mrs A. Buckstone, Mrs L. M. Greaves, Salmon Queen.—J. L. G.

CYCLAMEN: Rock Garden Species.

The hardy section of this genus includes many species valuable for the rock garden and shady fern border, though none is suitable for the perennial border. The foliage is in most cases marbled with silver. Propagation by means of seeds sown in a little heat in spring is easy. The plants thrive best in shady corners amongst other low growing plants, and those described below are undoubtedly the best.

Cyclamen Coum. — This has dark-green kidney-shaped leaves. Flowers crimson. Site shade. Soil sandy loam. It is a flowering bulb or corm blooming from January to March. Height, 3 ins.

C. Coum album has white flowers.

C. europaeum. — Leaves large, faintly zoned with silver. Flowers crimson, sweetly scented. Site shade. Soil sandy loam. Flowering Period, August to November. Height, 3 ins.

C. hederaefolium.—Syn. *C. repandum.*

C. ibericum (Syn. *C. vernum*).—Similar to *C. Coum,* but leaves are zoned with white. Flowers crimson with purple blotch. Site shade. Soil sandy loam. Flowering Period, January to March. Height, 3 ins.

C. ibericum Atkinsii has white flowers with crimson centre.

C. neapolitanum.—A handsome species with marbled foliage. Flowers bright rose with violet-crimson centre. Site shade. Soil sandy loam. Flowering Period, August to September. Height, 4-6 ins.

C. neapolitanum album has pure white flowers.

C. repandum (Syn. *C. hederaefolium*).—Leaves Ivy-like, with silver zone. Flowers rose-crimson. Site shade. Soil sandy loam. Flowering Period, April to May. Height, 4 ins.

C. repandum album has pure white flowers.

C. vernum.—Syn. *C. ibericum*.

W. I.

CYCLAMEN-FLOWERED DAFFODIL (*Narcissus cyclamineus*).—See *NARCISSUS SPECIES*.

CYCLODIUM.—Now included in the genus ASPIDIUM, for which see *FERNS AND FERN GARDENING*.

CYCLOPELTIS.—Now included in the genus ASPIDIUM, for which see *FERNS AND FERN GARDENING*.

CYCNOCHES.—See *ORCHIDS*.

CYDONIA.—For the best species see *CLIMBING AND TRAILING PLANTS* and *SHRUBS*.

CYLINDERS, CAPACITY OF.—See CAPACITY OF CYLINDERS under VOLUMES in *ARITHMETIC AND GARDENING*.

CYMBIDIUM.—See *ORCHIDS*.

CYNARA (Nat. Ord. Compositæ). This is a genus of hardy biennial or perennial turnip-rooted and tuberous-rooted plants of no beauty for garden decoration. *C. Cardunculus* is the *CARDOON*, on which a separate article is given; and *C. Scolymus* is the GLOBE ARTICHOKE, the culture of which is described in our article on *ARTICHOKES*.

CYNOGLOSSUM (HOUND'S TONGUE. Nat. Ord. Boraginaceæ).—One quite charming member of the Hound's Tongue family deserves wider popularity than it at present receives. This is the annual *C. Wallichii* (Syns. *C. calycinum*, *C. membranaeum*, and *C. microcarpum*). The genus is closely allied to *OMPHALODES*, to which we devote another article, and the pretty *O. verna* was once known as *Cynoglossum Omphalodes*, hence the general style of the several species may be gathered. *C. Wallichii* may be used in several forms of garden decoration, such as the formation of an edging to beds, for carpeting the ground under larger subjects, or for providing little groups in the rock garden. It is a pretty, blue, July flowering plant, growing about 9 ins. high. Seeds are best sown in the flowering positions, and sowing may be done either in September or March in comparatively poor soil. The flowers are freely borne, and are very like those of the Forget-me-not.

Other species sometimes described as annuals really belong to other genera. The biennial, perennial, and greenhouse species of the genus are outside the scope of the present work.

CYNOSURUS (DOG'S-TAIL GRASS. Nat. Ord. Gramineæ).—This is a genus of hardy grasses of little garden value. *C. echinatus* is the COCK'S-COMB GRASS grown sometimes in the wild garden, and averaging about 2 ft. in height. Some of the dwarfer species are used in lawn mixtures.

CYPERORCHIS.—See *ORCHIDS*.

CYPERUS (Nat. Ord. Cyperaceæ). This is a genus of sedges or grasses of no special garden value. *C. longus*, known as GALINGALE, and *C. rotundus*, the NUT GRASS, can both be grown in the damper portions of the wild garden, or in the water garden. They bloom in July, and grow 3 ft. and 1 ft. in height.

CYPRESS.—A name applied to the genus CUPRESSUS. See *TREES*.

CYPRESS OAK (*Quercus pedunculata fastigiata*).—See *TREES*.

CYPRESS SPURGE (*Euphorbia Cyparissias*).—See *EUPHORBIA*.

CYPRESS VINE (*Ipomoea quamoclit*). See *CLIMBING AND TRAILING PLANTS*.

CYPRIPEDIUM (LADY'S SLIPPER. Nat. Ord. Orchidaceæ). — This beautiful hardy plant is suitable for the shady part of the rock garden, and is propagated by division of the crowns in the autumn or spring.

What to Grow.—We briefly describe the best sorts below :—

Cypripedium Calceolus.—A tufted plant with broad leaves on stout stems. Flowers, sepals, and petals brown; lip yellow. Site shade. Soil calcareous rocky loam. Flowering Period, May to June. Height 1½ ft.

C. californicum.—This too is tufted. Flowers, sepals, and petals tawny-yellow; lip blush-white, spotted brown. Site shade. Soil moist, peaty. Flowering Period, May to June. Height, 1½ ft.

C. humile (Syn. *C. acaule*).—This has no stems. Leaves in pairs, broad. Flowers, sepals, and petals greenish; lip rosy-purple. Site shade. Soil moist, peaty, leafy. Flowering Period, May to June. Height, 6 ins.

C. macranthum.—A strong growing plant with tufted stems. Flowers, sepals, petals, and lip deep purple-rose, and large. Site half-shade. Soil sandy loam and limestone. Flowering Period, May to June. Height, 1 ft.

C. macranthum album.—A variety with pure white flowers.

C. montanum.—A distinct and desirable plant. Flowers, sepals, and petals brownish-purple; lip white-striped, red inside, and 3–4 on a stem. Site shade. Soil moist sandy peat. Flowering Period, May to June. Height, 1 ft.

C. pubescens (Syn. *C. hirsutum*).—A free-growing species. Flowers, sepals, and petals yellowish-brown; lip pale yellow. Site shade. Soil moist sandy peat. Flowering Period, May to June. Height, 1½ ft.

C. spectabile (Syn. *C. Reginae*).—The finest species of all. Flowers several on a stem, sepals and petals white; lip rose colour. Site half-shade. Soil well-drained heavy loam. Flowering Period, June to July. Height, 2 ft.

C. ventricosum.—A hybrid between *C. macranthum* and *C. Calceolus*, and intermediate in character.

W. I.

See also *HARDY ORCHIDS* and *ORCHIDS*.

CYRTOMIUM.—See *Aspidium falcatum* in *FERNS AND FERN GARDENING*.

CYRTOPHLEBIUM.—Now included in the genus POLYPODIUM, for which see *FERNS AND FERN GARDENING*.

CYRTOPODIUM.—See *ORCHIDS*.

CYSTOPTERIS.—For the best species and varieties, see *FERNS AND FERN GARDENING*.

CYTISUS.—For the best species see *SHRUBS*.

CZACKIA.—Now included in the genus PARADISEA.

D

DABOËCIA.—See *HEATHS* and *SHRUBS*.

DACTYLICAPNOS.—Now included in the genus *DICENTRA*.

DACTYLIS (COCK'S-FOOT GRASS. Nat. Ord. Gramineæ).—This is a genus of hardy grasses of very easy culture. They are not of any great garden value, but of weedy habit, and thus we do not propose describing species here.

DACTYLOCTENIUM.—Now included in the genus *ELEUSINE*.

DACTYLOPIUS.—See MEALY BUGS in *INSECT PESTS*.

DADDY LONG-LEGS.—See under LEATHER JACKETS in *INSECT PESTS*.

DAFFODIL ANEMONE (*Anemone narcissiflora*).—See *ANEMONE: ROCK GARDEN SPECIES*.

DAFFODIL GARLIC (*Allium neapolitanum*).—See *ALLIUM*.

DAFFODILS (Nat. Ord. Amaryllidaceæ).—**History.**—British gardens have had Daffodils in them for hundreds of years; but within the last quarter of a century they have risen to a prominence which has been most marked. There is hardly a garden of any size without its Daffodils, and shows for Daffodils have been established in various centres. In New Zealand they are even more a feature of spring shows than in the old country. About the end of the eighteenth, and in the early half of the nineteenth centuries, it was the Polyanthes or bunch-flowered varieties that alone were considered worthy of notice, but the one-flowered hold the pride of place to-day. The change has been brought about by the work of Herbert, Dean of Manchester, Backhouse of York, Leeds of Manchester, Barr of London, and more especially Engleheart of Dinton, the most famous raiser of new varieties who has ever lived. The modern developments of the flower are simply surprising. For convenience of reference the family has been divided into sections by the Daffodil Committee of the Royal Horticultural Society.

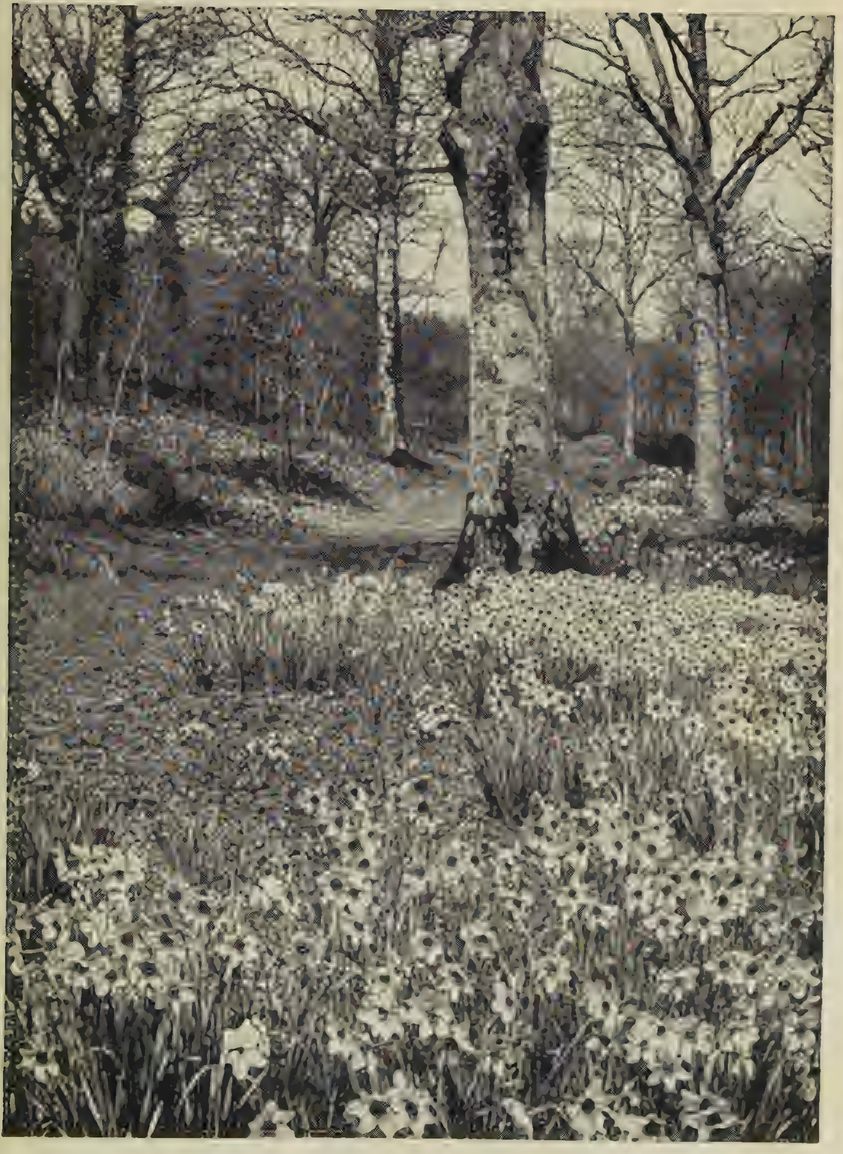
Classification; *R.H.S. Classified List of Daffodils*.—This list is most useful. All the schedules of Daffodil shows are more or less arranged according to its provisions, and in bulb dealers' catalogues the Daffodil part usually follows its main outlines. The divisions are based on (1) colour, (2) blood relationship, and (3) the general shape of the bloom, which depends on the proportions which the central part of the flower, or the corona, bears to the petals, or to write more strictly botanically, the perianth segments. (When the parts of the calyx and corolla are like one another, as in the Narcissus or Daffodil family, they are usually spoken of as a *Perianth*.)

The following are the divisions:—

(*a*) TRUMPET DAFFODILS.—The trumpet or corona is as long as or longer than the perianth segments. The sub-divisions depend on colour; *e.g.* (1) Yellow, (2) White, (3) Bicolor.

(*b*) INCOMPARABILIS.—The cup or corona must be not less than one-third, but less than equal to the length of the perianth segments. The sub-divisions depend on the colour of the perianth; (1) Yellow perianths, (2) White perianths.

(*c*) BARRII.—The cup or corona must be less than one-third the length of the perianth segments. The sub-divisions depend on the colour of the perianth; (1) Yellow perianths, (2) White perianths.



DAFFODILS, NATURALISED IN WOODLAND

(*d*) LEEDSII.—The perianths must be white, with white, cream, or pale citron cups, which are sometimes tinged with pink or apricot. The sub-divisions depend upon size; *e.g.* (1) Flowers of Incomparabilis proportions, (2) Flowers of Barrii proportions.

(*e*) TRIANDRUS HYBRIDS. — All varieties which obviously contain triandrus blood, such as *Queen of Spain* (yellow), and *Venetia* (white).

(*f*) CYCLAMINEUS HYBRIDS. — Flowers with cyclamineus as one of the parents.

(*g*) JONQUILLA HYBRIDS.—Varieties of *Narcissus Jonquilla* parentage, such as *Buttercup*, *Odorus*, etc. etc. Jonquil blood gives richness and smoothness of texture.

(*h*) TAZETTA AND TAZETTA HYBRIDS.—These are the POLYANTHES NARCISSUS of gardens. The new poetaz (hybrids between a poet and a bunch-flowered or tazetta variety) are also included.

(*i*) POETICUS VARIETIES. — All poets have pure solid white petals with a small eye, wholly or partly red.

(*j*) DOUBLE VARIETIES.

(*k*) VARIOUS.—This is an omnibus division, and includes certain species such as *N. Bulbocodium*, *N. cyclamineus*, *N. gracilis*, *N. triandrus*, *N. Jonquilla*, *N. juncifolius*, *N. viridiflorus*, etc. etc.

NAME OF FAMILY.—All Daffodils are Narcissi, and all Narcissi are Daffodils; Daffodil being the English and Narcissus the Latin name of the family. It is custom alone that limits the name Narcissus to the Poeticus and Tazetta sections. Parkinson in his *Paradisus* (1629) has some interesting remarks on nomenclature.

Border Cultivation.—Daffodils like a warm well-drained soil, and a moist atmosphere. The Poeticus section, however, prefers a fairly stiff rooting medium.

Plant as early as possible in the autumn, and beware of planting after Lord Mayor's Day. Never cut off the foliage while it is green; the bulbs may stand it once but not a second time. With few exceptions all varieties may remain in the ground for several years, but they should be top-dressed annually with sood soil mixed with bone-meal and *old* farmyard manure. These also are the best and safest manures to dig into the beds before planting.

All Daffodils do well in grass; in fact, certain sorts will not thrive anywhere else. Wait until the autumn rains have moistened the ground before planting. Avoid mixtures; much the best and most pleasing results are obtained when the varieties are kept distinct. One of the best examples of grass planting is to be seen at Glasnevin Gardens, Dublin. Even when the area to be covered is a large one, a Barr's Bulb Planter should be used. A general mistake is to plant too close together; with this tool it is hardly possible to do so. Never mow grass where Daffodils are until their foliage has become yellow.

Pot Cultivation. — Plant all varieties as early as possible in September, or the first two weeks in October. Where the bulbs have to live in a dwelling-house all the time, the middle of October is soon enough. Before bringing any pots into heat, be sure that they are filled with roots.

Enemies and Diseases.—The chief living enemies are the Merodon or large Daffodil fly; the Eumerus or small Daffodil fly, and the eelworm or *Tylencus devastatrix*. The chief disease is that caused by a Fusarium fungus. Slugs can also do much damage by eating off the roots. Whenever the foliage becomes curled and marked with brown stripes, expert advice should be obtained.

Raising Seedlings.—Seed should be sown very thinly in August in boxes or pans. These will be all the better for the protection of a cold airy frame. Allow the seedlings to remain two years in the seed boxes before planting out in nursery beds. Once planted out they may remain where they are until they bloom. Flowers may be expected in the fifth year; but a few will flower in the fourth year, and some not until the sixth or seventh.

Varieties for Garden Purposes.—Good garden varieties include the following, the letters which follow the names indicating the divisions to which they belong:—Argent (*j*); Barrii conspicuus (*c*); Bernardino (*b*); Blackwell (*b*); Cassandra (*i*); Duke of Bedford (*a*); Elvira (*h*); Emperor (*a*); Empress (*a*); Evangeline (*d*); Horace (*i*); J. T. Bennett-Poë (*e*); Lady Margaret Boscawen (*h*); Madame de Graaff (*a*); Norah Pearson (*d*); Odorus Campanelle (*g*); Pedestal (*b*); Philippe de Vilmorin (*a*); Poeticus recurvus (*i*); Seagull (*c*); Sir Watkin (*b*); Vestal Virgin (*a*); Virgil (*i*); White Lady (*d*).

The following are recommended for pot culture, the letters which follow the names again indicating the divisions to which they belong:—Argent (*j*); Aspania (*h*); Bedouin (*b*); Blackwell (*b*); Bulbocodium conspicuus (*k*); Cornelia (*a*); Diana (*d*); Emperor (*a*); Evangeline (*d*); Firebrand (*c*); Golden Spur (*a*); Henry Irving (*a*); Homer (*i*); Jaune à Merveille (*h*); J. T. Bennett-Poë (*e*); King Alfred (*a*); Lucifer (*b*); Madame de Graaff (*a*); Mrs Langtry (*d*); Princeps (*a*); Sir Watkin (*b*); Sunrise (*c*); Victoria (*a*); Weardale Perfection (*a*).

J. J. & E.

Varieties for Show.—These are improved upon so frequently that our contributors tell us it would be of no practical value to give a selection here. A bulb specialist should be consulted.—EDITOR.

NEW VARIETIES.

Incomparabilis Section: *Fortune.*—This has a yellow perianth and a rich orange-scarlet crown.

Ixion.—This has a lemon-yellow perianth and an orange crown.

Knight Templar.—This has a creamy-white perianth and a red crown.

Phineas.—This has a lemon-yellow perianth and a golden-yellow crown.

Yellow Standard.—This has a citron-yellow perianth and a golden-yellow crown. It is a giant flower.

Leedsii Section: *Miss E. M. Bowling.*—This has a creamy-white perianth, and half its trumpet is cream with a pink rim.

Poeticus Section: *Bridget.*—This has a white perianth and a rich red and green cup.

Cædmon.—This has a white perianth, and its cup is margined with dark red.

Crimson Braid.—This has a pure white perianth, a scarlet cup, and a yellow centre.

Thoroughbred.—This has a white perianth and a cup rimmed with crimson.

Trumpet Section: *Fides.*—This has a white perianth and a yellow trumpet.

General Bland.—This is a giant yellow variety, often 5½ ins. across the perianth.

General Townsend.—This is a pure yellow variety.

Tamora.—This has a snow-white perianth and a creamy-white trumpet.—W. J. C.

[It should be noted that the above is only a selection of those which have received official recognition. The list might be considerably extended.—EDITOR.]

DAGGER FLOWER (*Aster tanacetifolius*).—See *ASTER.*

DAHLIA : Culture of.

The cultivation of the Dahlia may be divided into two clearly defined sections, namely, for exhibition and for garden decoration. Few species of flowers are so well adapted for either purpose, as if grown for decoration the culture is simple, and the return in quantity of bloom is great, extending over a long period; while as an exhibition subject, especially for the man of small means, the Dahlia is second to none. An exhibition flower to be really popular, must require some considerable skill in order to perfect it, and a Dahlia needs just the care and attention, sufficient to impart zest to the competitor, without the need of any elaborate appliances or even a greenhouse or frame.

Culture for Exhibition.—Taking this first, it is safe to say that over-manuring is not a common occurrence, as a rich soil is the first essential.

We will deal with the routine work as regards the production of the finest Cactus Dahlias. This will perhaps give the best idea of what is suitable for all sections, with a few slight modifications of course.

Young plants from cuttings should be obtained in April, potted into 5-inch pots, and grown on till sturdy and well rooted. If no greenhouse or frame is available delay purchasing till May.

The land should be well manured, and deeply dug. It must be in a friable condition at planting time, which is about the 21st of May.

When planting, place the ball of soil from pots 2 ins. below the level of the ground, and tread the fresh soil gently but fairly firm round it. Put to each plant a stake at least 4½ ft. high, when fixed, and tie at once.

If the weather is dry, water once thoroughly, and spray overhead each evening, repeating the watering in a week's time.

As soon as the plants have become established and grown to 15 ins. in height, which will be by end of June, cut out the tips. From the side shoots which now break forth at each joint, select six or eight and allow these to grow and eventually flower.

By early July two additional stakes should be put to each plant, and rough string known as fillis run round the three stakes, just high enough for the young growths to reach, when each should be loosely secured with raffia.

As the shoots grow add another string, and so on till the plant in August presents a trim, well-kept appearance. It will be quite secure from wind.

Now comes the question of thinning, and feeding. If the largest flowers are looked for, only the central bud on each main shoot should be left, and the side growths down to three joints removed as well. Some varieties will also require a few big leaves cut off, and it is always safe to cut out all weakly shoots.

By early August feeding should commence. In dry seasons put some fresh cow or sheep manure in a tub or tank full of water, adding a bag of soot, and brew a strong dark-coloured mixture. To each plant give two gallons as often as water is needed, say twice a week. In wet weather the best way to feed is to sprinkle artificial manure and soot round the plants and let it wash in. The artificial may also be used when watering, and the Dahlia is not fastidious in its choice of proprietary fertilisers.

The old Double or Show Dahlia may be treated much in the same way, and if large flowers are wanted, the Paeony sorts may also have similar treatment.

One or two other sections are definite exhibition favourites, namely the little Pompon and the Singles; both of these are judged more from the standpoint of neatness than size, and to show big Pompons would be useless.

They should be grown well as regards the actual culture, but not disbudded. A large bushy plant freely covered with flowers is necessary when perfect blooms are wanted.

Culture for Garden Purposes.—Taking the Dahlia as a garden plant, our task is simplified, as quantity, rather than quality, is the object in view.

All sections are suitable for the purpose, although in the case of the Cactus it is necessary to ensure getting varieties with stiff stems. As in the case of exhibition plants, the soil should be well worked and manured, but less thinning and disbudding, or indeed none at all in the case of most varieties, is needed.

Dahlia Sections and Varieties.[1]—A brief description of the chief sections of the Dahlia family may be of use to beginners.

The CACTUS DAHLIAS are those with long narrow florets full to the centre, some forms being perfectly incurved, and others star-like. A dozen good exhibition sorts are:—

Alabaster (white).
A. R. Perry (rose and yellow).
F. W. Fellowes (orange, scarlet).
F. Wenham (fawn pink).
Guardian (crimson scarlet).
Miss Stredwick (yellow to pink).
Mrs. M. Stredwick (clear pink).
Patriot (scarlet).
Planet (white, speckled crimson).
Sussex (yellow).
Vulcan (maroon).
Washington (crimson).

We now come to the COLLERETTES, the daintiest of all the family. These have eight petals as in Single Dahlias, but each main petal has a tuft or collar of secondary florets, usually of contrasting colour. They are unequalled for all decorative purposes, and last well when cut and placed in water.

Many varieties are very similar, but a few distinct sorts include the following:—

Flame (vivid flame).
Garland (scarlet).
H. Farman (yellow, suffused red).
Hornet (crimson).
Louie Blackman (magenta).
Medallion (yellow).
Mizar (white, striped scarlet).
Nightingale (orange and yellow).
Queen Mary (rose pink).
Regularity (purple).
Rifleman (velvety maroon).
Swallow (white).

A striking class of Dahlias are known as DECORATIVES, and embrace many nondescript forms. Those termed "giant" are large, often huge, and have broad flat florets full to the centre. They are easy to grow, and have no special "show" points.

Twelve representative sorts should include:—

Brentwood Yellow (yellow).
Delice (rose pink).
Futurity (salmon buff).
Leviathan (crimson).
Mabel (mauve).
Madame Gustave Douzon (scarlet).
Mastiff (yellow to bronze).
Seahorse (yellow, tipped white).
Startler (cardinal, *i.e.* deep scarlet).
Sulphurea (sulphur yellow).
Warneford (white).
Wyvern (lilac).

---

[1] Dahlia Varieties change frequently, as do varieties of many florists' flowers. Thus what may now be a first-class sort may in a few years' time be the poorest variety of all. On the other hand it may not. Readers who wish to know the latest improvements should consult specialists in the trade, or the National Dahlia Society which exists for the furtherance of this flower's popularity.

DOUBLE OR SHOW DAHLIAS are the round ear-wiggy old-fashioned ones, and are perhaps, in their perfectly symmetrical outline, the greatest triumph of the florist's art.

Twelve of the best are :—

A. M. Burnie (orange).
Arthur Rawlings (crimson).
Chieftain (purplish lilac).
Colonist (chocolate and fawn).
Gracchus (orange buff).
John Walker (white).
J. T. West (yellow, tipped purple).
Mrs. Gladstone (pink).
Perfection (buff).
R. T. Rawlings (purple).
Tom Jones (cream, edged mauve).
William Rawlings (purple).

The Dahlias known as PAEONY-FLOWERED are semi-double, with flattish florets more or less irregular and informal. They are suitable for masses of colour in the flower border.

A useful dozen are :—

Amber Queen (amber).
Geisha (scarlet and yellow).
Holman Hunt (crimson).
Liberty (scarlet).
Luna (yellow).
Naomi (deep rose).
Phideas (salmon pink).
Samson (cardinal).
Sheila (pink).
Titian (petunia colour).
Wedding Day (red, tipped white).
White Flag (white).

POMPON DAHLIAS are the tiny round varieties. They should be grown in every garden, as they flower freely and are bright and effective.

Some good sorts include :—

Adelaide (blush).
Bacchus (red).
Barbara Purvis (white).
Darkest of All.
Emily Hopper (yellow).
Geo Ireland (heliotrope).
Glow (coral).
Johnny (maroon).
Neatness (salmon buff).
Nerissa (pink).
Rosa (blush white).
Tommy Keith (red, tipped white).

Secrets of Success.—These are four in number. Dig deep; manure well; plant good sorts; and, above all, securely stake and tie the shoots against damage by wind.—H. S.

UP-TO-DATE SELECTIONS.

Dahlia A. E. Amos.—Orange-red.
D. Acis.—Apricot rose.
D. Alpha.—Crimson-scarlet.
D. Anitra.—Lilac-rose and white.
D. Apoldro.—Crimson-scarlet.
D. Babs.—Scarlet-crimson.
D. Baby Royal.—Pink.
D. Baldre.—Red-rose on orange.
D. Betchworth Star.—Orange-red.
D. Bexhill Star.—Orange-red.
D. Caldicot Castle.—Scarlet.
D. Goliath.—Double.
D. Perfection Giant Single.—Many colours.
D. Pigmy.—Single. Many colours.
D. Single.—Many delightful shades.
D. Clown.—Vermilion and white.
D. Coltness Gem.—Scarlet.
D. Coltness Scarlet.—Scarlet.
D. Coltness White.—White.
D. Coltness Yellow.—Yellow.
D. Congress.—Useful miniature Cactus.
D. Cora.—Cerise and orange.
D. Corona.—Apricot pink.
D. Delos.—Claret and orange.
D. Demon.—Scarlet crimson.
D. Doris J. Cooper.—Mauve.
D. Dorret.—Pink.
D. Dusart.—Yellow.
D. Early Yellow.—Lemon-yellow.
D. Edgeham.—Yellow.
D. Edith.—Rose.
D. Electra.—Yellow.
D. Elma D. Cook.—Lemon-yellow.
D. Emulation.—Lilac.
D. Erika.—Maroon-crimson and white.
D. Ethelwulf.—White and lemon-yellow.
D. Fabian.—Golden yellow and amber-gold.
D. Fantasy.—Orange-scarlet and white.

D. Florence M. Davies.—Buff-orange.

D. Frau O. Bracht.—Cream and lemon-yellow.

D. Fred Ransome.—Maroon.

D. Freedom.—Apricot on orange-cream.

D. Gaiety.—Rose.

D. Galaxy.—Red and yellow.

D. George L. Fanum.—Red.

D. Giant Kriemhilde.—Pink and cream.

D. Glamis.—Yellow.

D. Hilda.—Useful Charm Dahlia.

D. Imperialis.—Several shades.

D. Irma.—Purple and crimson.

D. Ivy.—White.

D. J. L. Crowther.—Pink on yellow.

D. Josephine Adair.—Yellow.

D. Kentucky.—Apricot pink.

D. Leith Star.—Orange-red.

D. Leonore.—Salmon.

D. Little Marvel.—Pink.

D. Lowfield Maroon.—Crimson-maroon.

D. Lycette.—Yellow.

D. Mabel Crossling.—Orange.

D. Madame A. Breuls.—Pink.

D. Magician.—Yellow and buff.

D. Margate Star.—Rose and orange-yellow.

D. Marquesse de Hautpaul.—Salmon-pink.

D. Mermaid.—Lemon-yellow.

D. Mevrouw E. Ludwig.—Scarlet.

D. Mignon Collarette.—Scarlet and white.

D. Minnie. — Rose-pink and orange.

D. Miss G. Kenkeel.—Scarlet.

D. Mrs A. S. Galt.—Scarlet.

D. Mrs Charles Hay.—Scarlet-rose and orange.

D. Mrs D. Hepburn.—Scarlet.

D. Mrs E. Bradley.—White and ivory white.

D. Mrs H. Blackman.—White or pale cream.

D. Mrs J. Goddard.—Scarlet.

D. Mrs J. L. Gibson.—Buff and red-orange.

D. Mrs John Crowther.—Purplish.

D. Mrs Neville Marriage.—Orange-red.

D. Mrs W. T. Smith.—Pink and yellow.

D. Mrs Wm. Clarke.—Reddish-rose on orange.

D. Nanty.—Rose and orange.

D. Nego.—Maroon.

D. Nuam.—Orange-scarlet.

D. Olive.—Rose.

D. Onah.—Yellow flushed orange.

D. Oracle.—White and red.

D. Orange Bedder.—Red-orange.

D. Our Mary.—Orange-salmon and buff.

D. Peggy Wood. — Rose and orange.

D. Pete.—Rose or rose-pink.

D. Peter Frowd.—Ivory white and pure ivory.

D. Pink Perfection.—Pink.

D. Prelate.—Scarlet-crimson.

D. Premier.—Yellow and amber.

D. Pride of Crawley.—White and ivory.

D. Princess Elizabeth.—Carmine-crimson.

D. Princess Margaret.—Scarlet and yellow.

D. R. Findlay.—Yellowish-green.

D. R. H. Holton.—Scarlet.

D. R. Treat.—Purple and rose.

D. Ramon.—Scarlet.

D. Rangoon.—Orange-scarlet.

D. Red Riding Hood.—Scarlet.

D. Redpole.—Scarlet-crimson.

D. Rev. L. Hooper. — Rose-purple.

D. Rev. M. Herbert Lee.—Maroon-red.

D. Royal Velvet.—Scarlet-crimson.

D. Ruth.—Pink and crimson.

D. Honeycomb.—Many colours.

D. New Star.—Many colours.

D. Single Dwarf Bedding.—Very wide colour range.

D. Scarlet Glow.—Scarlet.

D. Schiller.—Salmon or salmon-pink.

D. Seefield.—Pink on yellow.

D. Shot Silk.—Rose-red and orange.

D. Sitkin.—Rose-pink.

D. Stedfast.—Scarlet.

D. Stella.—Rose-pink.

D. Double Cactus.—Various beautiful colours.

D. Dwarf Single.—Great colour range.

D. Giant Single.—Splendid range of colour.

D. Mammoth Decorative Double.—Many colours.

D. Single Star.—Many colours.

D. T. Freeman.—Rose-pink.

D. Tanglewood.—Red-scarlet.

D. Teasel.—Rose, yellow, and red.

D. Tessa.—Scarlet-orange.

D. The Bishop of Llandaff.—Scarlet.

D. The Duchess.—Yellow and white.

D. Togo.—Bright red.

D. Topaz.—Orange-scarlet.

D. Towneley.—Orange.

D. Tunis.—Red.

D. Unicum.—Cerise and cream.

D. Unwin's Dwarf Hybrids.—Splendid range of colour.

D. Vesta.—Orange-rose and purple.

D. W. D. Cartwright.—Buff-yellow and orange-yellow.

D. Webb's Double.—Various shades.

D. Webb's Premier Single.—Many colours.

D. White King.—White.

D. Whynne.—Yellow.

[**Storing Dahlias.**—Just a word about the storing of Dahlia roots after the flowering season is over. They are not sufficiently hardy to be left out of doors in the open ground unprotected. We find it is best to lift them in late October or early November and store them in a dry frost-proof shed, though not necessarily in darkness, after cutting off the top-growth to within 9 ins. of the roots. In April these roots are brought out, some of the bigger tubers being cut off, and the roots split up so as to obtain a strong "crown" so to speak. The roots are then started in a greenhouse or on a hotbed, duly hardened off and planted out in exactly the same manner as our contributor recommends for cuttings.—EDITOR.]

DAHLIA : Historical Notes.

The Dahlia has been grown in Europe since 1789, in which year Cervantes of the Mexico Botanic Garden sent three varieties to the Abbé Cavanilles of Madrid. It was then a new and unknown plant, and after it had been flowered in the Madrid Botanic Garden, Cavanilles named it *Dahlia* out of respect for the great Swedish botanist André Dahl.

These varieties were figured and described by Cavanilles in his "*Icones*"; they were called *Dahlia pinnata*, *D. rosea*, and *D. coccinea*, all large, broad, flat-petalled, single-flowering varieties.

Some confusion was caused in the early days of the flower's history by Willdenow of Berlin giving the plant another name, that of *Georgina*, but ultimately on the score of priority, English, French, and other botanists, except the Germans, decided to revert to the original name, and by them Dahlia has ever since continued to be used.

It has been erroneously stated by every writer on Dahlia history for upwards of a century that this flower was originally introduced into England in 1789, but this is an error which has been fully exposed by the present writer in a paper entitled "The Dahlia, its reputed introduction in 1789," which appeared in the Journal of the R.H.S. (see Parts II. and III., vol. xlii.). It is there shown beyond question that it was not till 1798 that the plant, through the instrumentality of Lady Bute, reached this country, and that it was grown at Kew for a few years and then disappeared.

The credit of its second introduction into England is due to Lady Holland, who in 1804 sent seeds home from Spain. Since that time its cultivation has been continuous ; the flower was taken in hand by skilful florists, and was soon improved in form, size, and colour. It was therefore not long before it took rank as an exhibition flower, and many and frequent were the shows organised to encourage its culture.

The great object in view in its early days was to get the flower to double. This was a slow and gradual process, as can be seen by reference to the numerous publications in which the Dahlia was represented and referred to. But the florists' desire was ultimately accomplished, and the result was that type known as the old show and fancy varieties : big, solid, globular flowers which were once the pride of the dahlia fancy, but which have now been somewhat eclipsed by the less formal-looking novelties of later years.

In 1802 it was introduced into France. André Thouin figured and described it in 1804. De Candolle six years later also wrote about it. It soon became widely grown in France, the Comte Lelieur and many other seedling raisers doing excellent work in elevating the flower to a higher standard of perfection. About the same time the German horticulturists received plants, and their efforts in seeding and improving the flower resulted in great changes in it. Hartweg, Otto, Fintelmann, Deegen, and others are worthy of mention in respect of the popularity of the flower gained in their country.

For many years, whatever may be said to the contrary, Dahlias were confined to that type known as the old show and fancy varieties, and no break was made until the year 1850. In that year Sieckmann of Köstriz obtained and put into commerce the first pompon dahlia, thus creating a new departure ; this little floral gem was variously denominated lilliputian, bouquet, but more recently pompon.

The Cactus type also came originally from Mexico, and was the precursor of the new race of decorative and exhibition flowers now so highly esteemed. Like the more recently introduced paeony type the cactus dahlia reached us through Holland, where it had been grown some few years prior to its introduction here.

The Collerette section was another peculiar departure from the normal, the first example of these being raised at Lyons, in France, in the year 1899. The singles, the decoratives, and one or two other sections all tend to prove how variable this New World plant has been. Its history and literature are very extensive, and necessitate a knowledge of English, French, and German to enable the student to dive deeply into the records, for in the early days it was a flower of European reputation, and justice cannot be done to the subject in a few paragraphs.

To encourage its culture the National Dahlia Society was founded many years ago, and still continues its good work holding its exhibitions, publishing its catalogues and other literature with almost unfailing regularity.

In America remarkable progress has been made in dahlia cultivation ; it is rapidly extending over the Union, and there is no doubt that the formation of the American Dahlia Society will do much to help its members and the general public to become acquainted with the beauty and the usefulness in so many ways of this very gorgeous autumn flower.—C. H. P.

DAHLIAS FOR CITY GARDENS.—See *TOWN AND CITY GARDENING.*

DAINTY BOLET.—See EDIBLE FUNGI in *FUNGI: EDIBLE AND HARMFUL.*

DAISY (*Bellis.* Nat. Ord. Compositæ).—The daisies, so well known as dwarf-growing, hardy herbaceous perennials, cannot be said to be amongst the best flowers in cultivation, but most people are too fond of them to overlook them. The sight of a good patch of these bordering a perennial parterre will often bring back happy memories of childhood's days and the daisy chains made in them long ago. Certainly the plants are very easy to grow; most species come very freely from summer-sown seed in the usual way, and all are freely propagated by division either immediately after flowering or in the autumn and spring. *B. perennis* is often used for winter or spring bedding, and is then treated as a hardy biennial; or stock may be obtained by dividing established plants in July, growing them on in the reserve garden, and planting out in October. We recommend the following three species:—

Bellis perennis.—This, the best known daisy of all, is available in red, rosy-pink, cream, and white. The best varieties of it are *hortensis* and *tubulosa.* Both are double red, both bloom freely in June, and both average 3–6 ins. in height. The type is a weed, and as such is described in our article on *WEEDS.*

B. rotundifolia.—This is a white species, but its other characteristics are similar to *B. perennis.*

B. sylvestris.—This bears white flowers from June onwards, and averages 6–12 ins. in height.

[A number of other daisies distinct from Bellis will be found dealt with in different articles.—Editor.]

See also *WEEDS.*

DAISY BUSH.—The genus OLEARIA. See *SHRUBS.*

DAISY GRUBBERS. — See *GARDEN TOOLS.*

DAMASK ROSE (*Rosa damascena*).—See *ROSE SPECIES.* For the best varieties see *ROSE CLASSES.*

DAME'S VIOLET.—See *ROCKET.*

DAMP-HATING ROCK PLANTS.—See ROCK PLANTS DISLIKING DAMP in *ROCK PLANTS FOR ALL PURPOSES.*

DAMPING DOWN.

Most greenhouse plants benefit by this in the summer, and hothouse plants benefit by it throughout the year. The staging and floor of greenhouses, and the foliage of plants themselves, is easily damped down by means of a fine-rosed watering-can. For the roof and walls, also for tall climbers, etc., a syringe has to be employed. Damping down cannot be overdone in the summer, but in the winter it should be done with the greatest caution when necessary, as otherwise it may do more harm than good.

DAMPING OFF.—See *DISEASES OF PLANTS.*

DAMSONS AND BULLACES.

These are useful as wind-breaks, and do not take much room in the garden. If grown as standards they give very little shade. Their culture is easy, and good results will follow if the general hints on hardy fruit culture are adopted.

SELECTION OF SORTS.

Bradley's King.—Oval, very prolific. Sweet and delicious.

Shepherd's Bullace.—Green and yellow. Useful in November.

The Cheshire Prune (weeping variety).—Large, bears freely some years. Ready in October and November.

The Damascene of Worcester.—Large, very rich cooked. Good bearer.

The Mereweather.—Very fine. As large as *Prolific Plum.* Late, with rich Damson flavour—extra good.

Veitch's Black Bullace.—Great bearer. Ready end of October.

G. B.

DANDELION.—See *MEDICINAL HERBS, SALAD PLANTS,* and *WEEDS.*

DAPHNE (GARLAND FLOWER. Nat. Ord. Thymelaeaceæ).—A genus of dwarf shrubby rock plants, bearing sweetly scented waxlike flowers. They are propagated by cuttings in July, or by grafting, and all require well-drained gritty loam and peat, except one or two lime lovers.

Rock Garden Species.—The best are briefly described below:—

Daphne alpina.—A small bush with white flowers. Site sunny. Soil gritty loam and peat. Flowering Period, May to June. Height, 1–2 ft.

D. blagayana.—A prostrate shrub with large white flowers. Site half-shade. Soil, peat and loam, stony. Flowering Period, May to June. Height, 1 ft.

D. Cneorum.—An evergreen trailing shrub with rosy-pink flowers. Site half-shady. Soil, peat and loam. Flowering Period, May to June. Height, 1 ft. The variety *alba* has white flowers.

D. petraea (Syn. *D. rupestris*).—A dwarf shrub with pink flowers. Site half-shade. Soil, calcareous loam, rocky. Flowering Period, May to June. Height, 4 ins.

W. I.

NEW VARIETIES.

Daphne Cneorum Veiloti.—This has sweetly scented, deep rose flowers, on leafy branches, but not so dense as the type.

D. petraea grandiflora.—This bears large pink flowers. It is a very dwarf subject, only 2 ins. high.

See also *SHRUBS.*

DAPHNIPHYLLUM.—For the best species see *SHRUBS.*

DAREA.—Now included in the genus ASPLENIUM, for which see *FERNS AND FERN GARDENING.*

DARI.—See *SORGHUM.*

DARNEL (*Lolium temulentum*).—See *LOLIUM.*

DARWIN TULIPS.—See under VARIETIES in *TULIPS.*

DATE PALM (*Phoenix dactylifera*).—See *PALMS.*

DATE PLUM.—The genus DIOSPYROS and *D. Kali.* See *TREES.*

DATURA[1] (Syn. *Brugmansia.* Nat. Ord. Solanaceæ).—This is a genus of greenhouse shrubs and annuals. The shrubby species attain a height of 10–12 ft., and the annuals about 2 ft. Turfy loam, with a liberal addition of well-decayed manure and some sharp sand, is a suitable compost. Propagation is best effected by cuttings for the shrubby species, and by seed for the annuals.

Culture.—Cuttings, about 6 ins. long, taken with a heel, will root readily in light soil if given gentle bottom heat. Seeds sown in heat in the spring soon germinate. The young plants should be hardened off, and may be planted out when all danger of frost is over.

USES.—The shrubby species are only suitable for large greenhouses, as the branches spread widely. Established plants are, however, extremely handsome when in bloom during July and August, and the flowers are sweetly scented. When grown in pots or tubs, they may be placed out of doors during the summer months. Winter treatment is the same as that given to the *FUCHSIA,* which see. The annuals may be grown and used in the same way as any other greenhouse plant.

---

[1] A popular name for Datura is THORN APPLE.—EDITOR.

Varieties.—*Datura suaveolens*, and its garden form *Knightii*, are the best known and most useful. These, and *Arborea*, have white flowers. *D. chlorantha*, a May flowering species, is yellow, and *D. sanguinea* bears scarlet blooms in August. The two last are not often grown now.

J. L. G.

See also THORN APPLE in *MEDICINAL HERBS.*

DAUCUS (Nat. Ord. Umbelliferæ). A large number of annual and biennial species of this genus have been described, and some of them are offered at times in catalogues to the unwary amateur. All the species save one are far too weedy to be worthy of a place amongst one's flowers. The one exception, which has in the past War years been seen in flower borders with some success (especially as an edging) is *D. carota*, the common CARROT of the kitchen garden, the culture of which is fully described in our article on *CARROTS.*

DAVALLIA.—For the best species and varieties see *FERNS AND FERN GARDENING.*

DAVID'S HARP (*Polygonatum multiflorum*).—See *SOLOMON'S SEAL* and *WATER GARDEN: PLANTS FOR THE* (in the last article see under SOLOMON'S SEAL).

DAY FLOWER.—See *COMMELINA.*

DAY LILY (*Hemerocallis*).—See *HEMEROCALLIS* and *WATER GARDEN: PLANTS FOR THE.*

DEADLY NIGHTSHADE.—A synonym for BELLADONNA, which see in *MEDICINAL HERBS.*

DEADLY NIGHTSHADE (*Atropa Belladonna*).—See *ATROPA*, and under BELLADONNA in *MEDICINAL HERBS.*

DEADNETTLE.—See under RED DEADNETTLE in *WEEDS.* See also *LAMIUM.*

DEATH CAP.—See ARCH-BANE under HARMFUL FUNGI in *FUNGI: EDIBLE AND HARMFUL.*

DECIDUOUS CEDAR.—See the genus TAXODIUM in *TREES.*

DECIDUOUS CYPRESS (*Taxodium distichum*).—See *TREES.*

DECIDUOUS SUBJECTS.—See *GARDEN FENCES.*

DECORATIVE DAHLIAS.—See DAHLIA SECTIONS AND VARIETIES in *DAHLIA: CULTURE OF.*

DECORATIVE HEDGES.—See *GARDEN HEDGES.*

DEER GRASS (*Rhexia virginica.* Nat. Ord. Melastomaceæ).—This pretty little hardy perennial, bearing purple flowers about July, is not as much grown as it might be. It is of very easy culture in light loam, peat, and sand, and may be propagated in the usual way by root division in the spring. The height rarely exceeds 9 ins.

DEERBERRY (*Vaccinium stamineum*). See *SHRUBS.*

DELPHINIUM, ANNUAL.—See *LARKSPUR.*

DELPHINIUM[1] (Nat. Ord. Ranunculaceæ). — Hardy herbaceous perennials, 3–8 ft. high, succeeding in ordinary garden soil well worked and liberally manured. They are propagated by seed sown in spring, in which case the plants should bloom in fifteen months or so after germination. They are also increased by division of roots in the autumn or spring. Seedlings from a good strain of seed will give flowers of excellent quality, but if the named varieties are wanted plants must be procured.

Cultural Notes.—Growing as they do to a height of 6 ft. or more, Delphiniums are almost unsurpassed for stately effect in the flower borders. In good soil the plants should be placed at least 3 ft. apart, clumps of five or seven together giving a good effect. In shallow or poor soil, manure must be liberally incorporated, and liquid stimulants given in the growing season. The flower spikes are at their best in June and July, but if these are removed as soon as the blossoms fade, secondary growth will give useful spikes of flowers in September. Slugs are particularly fond of the young growths in spring, and it is well to protect them with frequent dustings of soot, which will act as a manure at the same time.

---

[1] Delphiniums are also known as LARKSPURS, although this name now is more or less limited to the annual species and varieties. For these last see article on *LARKSPUR.*—EDITOR.

Varieties.—Capri, Dusky Monarch, Henri Moisson, His Excellency, King of Delphiniums, Masterpiece, Moerheimi (white), Persimmon, Princess Juliana, Rev. E. Lascelles, Statuaire Rude, The Alake.—J. L. G.

DELPHINIUM : Perennial Border Species.—On account of the great number of garden varieties, Delphinium species are not much grown. Most of them are attractive, as well as of very easy culture, and may be grown in the manner already outlined. They are propagated without difficulty by seeds and root division at the usual times. We recommend the following :—

Delphinium altissimum. — This bears blue flowers in July, and grows 6–9 ft. in height.

D. cardinale.—This bears scarlet flowers in August, and grows a yard in height. It is a biennial or short-lived perennial.

D. cashmirianum. — This bears dark blue flowers in July, and grows 1–1½ ft. high. Its variety *album* is white.

D. caucasicum.—This bears violet-blue flowers in July, and grows half a yard in height.

D. crassicaule.—This bears pretty blue flowers in June, and grows 2 ft. high.

D. dyctiocarpum. — This bears blue flowers in July. Height, 4 ft.

D. elatum.—This and its variety *alpinum* both bear blue flowers from July onwards, and average 5–6 ft. high.

D. exaltatum.—This bears blue flowers from July to August, on plants a yard high.

D. formosum.—This bears bright blue flowers from June to August, and grows a yard in height.

D. grandiflorum.—This bears deep blue flowers in July, and grows 1½–2 ft. in height. Its varieties *album* (white), *flore pleno* (double blue), and *rubrum* (red) are also worthy of culture.

D. hybridum.—This bears blue flowers from July onwards, and grows a yard in height.

D. nudicaule.—This bears attractive orange-scarlet flowers from June onwards, and grows about half a yard in height.

D. speciosum.—This bears attractive blue flowers from July onwards, and grows 4–5 ft. in height. Its varieties *glabratum* and *turkestanicum* are also worth including.

D. triste.—This bears blue flowers in June, and grows about half a yard in height.

UP-TO-DATE SELECTIONS.

Delphinium Annual Blue Boy.—Blue.

D. An. Blue Butterfly.—Blue.

D. An. Blue Fairy.—Pale blue.

D. An. Cambridge Blue.—Brilliant blue.

D. An. Blue Butterfly.—Rich blue.

D. An. Dwarf Rocket.—Many colours.

D. An. Emperor Double.—Several shades.

D. An. Single Tall Branching.—White, mauve, blue, pink, etc.

D. An. Stock-Flowered. — Blue, white, pink, mauve, etc.

D. An. White Fairy.—White.

D. Barwick Gem.—Blue.

D. Belladonna Hybrids.—Rich blue.

D. B. Dark Blue.—Very rich blue.

D. New Giant Flowered. — Fine rich colours.

D. D. B. Crane.—Lavender, blue, and white.

D. hybridum King of Delphiniums. —Blue and white.

D. h. Millicent Blackmore.—Mauve and blue.

D. h. Improved.—Many colours.

D. h. Light Blue.—Fine blue.

D. Lady Bath.—Double blue and mauve.

D. Lady Macbeth.—Purplish-rose and white.

DENDROBIUM.—See *ORCHIDS.*

DENDROCALAMUS. — A species of BAMBOO. See *BAMBOOS.*

DENTARIA.—Now included in the genus *CARDAMINE.*

DEODAR (*Cedrus Deodara*). — See *TREES.*

DEPRESSARIA.—See FLAT BODY MOTHS in *INSECT PESTS.*

DEPTFORD or THRIFT PINK (*Dianthus Armeria*).—See *DIANTHUS.*

DEPTH TO PLANT BULBS.—See *BULB PLANTING.*

DERMASEA.—Now included in the genus *SAXIFRAGA.*

DESCHAMPSIA (Nat. Ord. Gramineæ).—This is a genus of weedy grasses of no garden value whatever, though sometimes recommended as being good wild garden plants. *D. caespitosa* is the well-known TUSSOCK GRASS, while *D. flexuosa* is popularly known as BENT GRASS. This last must not be confused with the weed described by that name in our article on *WEEDS*, which botanically is *Agrostis vulgaris*, as the two are not synonymous.

DESFONTAINEA.—For the best species see *CLIMBING AND TRAILING PLANTS* and *SHRUBS.*

DESIGN.—See *GARDEN DESIGN.*

DESMODIUM (TICK TREFOIL. Nat. Ord. Leguminosæ).—A good many species of this genus are stove evergreen shrubs, and are thus out of the scope of the present volume. The few that concern us are hardy herbaceous perennials succeeding in light, rich soil, to which some peat has been added, and in a sunny site. They may be propagated by division of the roots in the spring and planted in March. *D. canadense*, the TELEGRAPH PLANT, is one of the best species. It bears purple flowers in July, and averages 6 ft. in height. *D. paniculatum* and *D. rotundifolium* are two other good sorts. The first bears purple flowers and the second white. Both bloom in July, and average 2 ft. high.

See also *CLIMBING AND TRAILING PLANTS.*

DESSERT APPLES.—See *APPLE.*

DESSERT PEARS.—See *PEAR.*

DESSERT PLUMS.—See *PLUM.*

DESTROYING TREE STUMPS.—See *TREE STUMPS: DESTROYING.*

DEUTZIA.—For the best species see *SHRUBS.*

DEVIL-IN-A-BUSH.—The same as DEVIL-IN-A-MIST.

DEVIL-IN-A-MIST.—See *LOVE-IN-A-MIST.*

DEVIL'S-BIT SCABIOUS (*Scabiosa Succisa*).—See *SCABIOUS.*

DEVIL'S CLAWS (*Ranunculus arvensis*).—See note at end of *RANUNCULUS.*

DEVIL'S DUNG (*Ferula Narthex*).—See *FERULA.*

DEVIL'S TURNIP (*Bryonia dioica*).—See *BRYONIA.*

DEWBERRY (*Rubus caesius*).— See *SHRUBS.*

DIAMOND BACK MOTH.—See *INSECT PESTS.*

DIANTHUS (PINK. Nat. Ord. Caryophyllaceæ). — The genus Dianthus is an extensive one, and comprises numerous species of high garden value, while it has also given rise to a great number of varieties and hybrids, too numerous to detail in a work of this description. Of the species in cultivation by far the greater proportion are perennials, but a few annuals and biennials are of some value. Many of these have, however, been greatly overlooked by gardeners, mainly through the deservedly high place taken by the varieties of *Dianthus plumarius*, the GARDEN PINK; *D. Caryophyllus*, the CARNATION; *D. chinensis*, the popular annual or biennial INDIAN PINK; and *D. barbatus*, the SWEET WILLIAM, all of which are treated more fully elsewhere. Many of these species are of extreme beauty.

Culture.—The cultivation of the plants is generally easy, and most of them succeed if given the usual treatment of ordinary border or rock plants. Their general habit will, however, be a good guide to their requirements. Those with vigorous growth and large foliage are usually easy to grow in ordinary soil, if this is not too heavy, and are almost invariably lime-lovers. Those of close, tufted habit, such as *Dianthus alpinus* and *D. Freynii*, appear to prefer a compost of loam, leaf-soil, sand, and grit in about equal proportions, and are greatly benefited by being top-dressed in the spring and autumn, working some fine soil of the same nature in among the foliage with the fingers.

Propagation.—Practically all the Dianthuses may be propagated by means of seeds, but the hybrids and meritorious varieties are increased by division, cuttings, and, in some cases (*e.g.*, those with the same habit as the GARDEN PINKS), by pipings, or parts of the shoots pulled out at a joint and inserted in sandy soil under glass.

Seeds of the Dianthuses may be sown under glass in spring, either in shallow drills in a frame, or in pots, pans, or boxes, employing an open compost, such as that used for seeds of other hardy flowers. Some of the more robust species can even be sown in the open, preferably in sandy soil in shallow drills about 6 ins. apart, sowing the seeds very thinly about ¼ in. deep, and thinning out the seedlings to about 6 ins. apart.

The annuals, or more tender biennials, such as the INDIAN PINKS, *Dianthus chinensis*, can be sown thinly where they are to bloom, or earlier in pots or boxes under glass; the seedlings being duly pricked out, hardened off, and finally put in their outdoor quarters at the end of May. The hardier biennials, such as the SWEET WILLIAM (*Dianthus barbatus*), should be sown in shallow drills in the open or under glass in May, June, or July. Early sowing is best, and the work is frequently delayed far too long. The seedlings should be pricked off 6–10 ins. apart as soon as they can be handled. If bushy plants with several spikes are desired, the points of the seedlings may be pinched after they have been pricked out for about a month. They may be planted out finally where they are to bloom in autumn or spring. Specially good varieties may be propagated by striking side-shoots or by layering them, and this method must be adopted to perpetuate the old Double Dark Crimson Sweet William.

What to Grow.—Below we briefly describe the best sorts out of several hundreds which are now known:—

Dianthus alpinus.—The ALPINE PINK, with red or white flowers in May. Height, 4 ins.

D. arboreus.—The TREE PINK, with pink flowers in July. Height, 18 ins.

D. arenarius.—The SAND PINK, with pink flowers in July. Height, 6 ins.

D. Armeria.—The DEPTFORD or THRIFT PINK, with red flowers in August. Height, 12 ins.

D. arvernensis.—The AUVERGNE PINK, with rose flowers in May. Height, 6 ins.

D. atrorubens. — The CRIMSON PINK, with deep crimson flowers in July. Height, 18 ins.

D. barbatus.—The SWEET WILLIAM, with flowers in various colours from June onwards. Height, 6–12 ins. (See article on *SWEET WILLIAM.*)

D. caesius.—The CHEDDAR PINK, with rose-pink flowers in June. Height, 9 ins.

D. calalpinus.—Crimson flowers in June. Height, 4 ins.

D. callizonus.—The ZONED PINK, with crimson flowers in June. Height, 2 ins.

D. capitatus.—The CLUSTER PINK with crimson flowers in June. Height, 12 ins.

D. Carthusianorum.—Red flowers in July. Height, 18 ins.

D. Caryophyllus. — The CARNATION, with flowers in various colours from July onwards. Height, 18 ins. (See article on *CARNATIONS.*)

D. chinensis.—The INDIAN PINK, with flowers in various colours from July onwards. Height, 9 ins. (See article on *INDIAN PINKS AND JAPAN PINKS.*)

D. ciliatus.—The CILIATED PINK, with pink flowers in July. Height, 18 ins.

D. cinnabarinus. — Cinnabar-red flowers in July. Height, 12 ins.

D. cruentus. — The BLOOD-RED PINK, with red flowers in July. Height, 10 ins.

D. deltoides.—The MAIDEN PINK, with red or white flowers in June. Height, 6 ins.

D. dentosus.—The AMOOR PINK, with violet-lilac flowers in June. Height, 6 ins.

D floribundus.—Rose-pink flowers in July. Height, 12 ins.

D. fragrans.—The FRAGRANT PINK, with white flowers in July. Height, 12 ins.

D. Freynii.—Pink flowers in June. Height, 2 ins.

D. furcatus.—The FORKED PINK, with red flowers in July. Height, 12 ins.

D. gallicus.—Purple flowers in August. Height, 9 ins.

D. giganteus.—The GIANT PINK, with purple-red flowers in August. Height, 36 ins.

D. glacialis.—The GLACIER PINK, with red flowers in July. Height, 3 ins.

D. gracilis.—Rose flowers in July. Height, 6 ins.

D. graniticus. — The GRANITE PINK, with red or white flowers in June. Height, 9 ins.

D. hirtus.—The HAIRY PINK, with red flowers in July. Height, 12 ins.

D. hybridus.—The MULE PINK, with flowers in various colours from June onwards. Height, 12 ins.

D. microlepis.—Red or white flowers in June. Height, 3 ins.

D. monspessulanus.—The MONTPELIER PINK, with red or white flowers in July. Height, 12 ins.

D. neglectus. — Rose - coloured flowers in June. Height, 3 ins.

D. nitidus.—The SHINING PINK, with pink flowers in July. Height, 6 ins.

D. noeanus.—White flowers in July. Height, 12 ins.

D. petraeus.—The ROCK PINK, with white flowers in July. Height, 6 ins.

D. pinifolius.—Pink flowers in June. Height, 2 ins.

D. plumarius.—The GARDEN PINK, with flowers in various colours in June. Height, 9 ins. (See article on *PINK.*)

D. pungens.—Pink flowers in July. Height, 12 ins.

D. rupicola.—Red flowers in June. Height, 12 ins.

D. squarrosus.—The SQUARROSE PINK, with white flowers in July. Height, 12 ins.

D. Sternbergii. — STERNBERG'S PINK, with pink flowers in June. Height, 15 ins.

D. suaveolens.—White flowers in July. Height, 12 ins.

D. superbus.—Rose flowers in July. Height, 12 ins.

D. sylvestris.—Rose flowers in July. Height, 12 ins.

D. tener.—Red flowers in July. Height, 6 ins.

D. zonatus.—White flowers, spotted red, in July. Height, 3 ins.

See also articles on *CARNATIONS*, *INDIAN PINKS AND JAPAN PINKS*, *PICOTEE*, *PINK*, and *SWEET WILLIAM*.—S. A.

UP-TO-DATE SELECTIONS.

Dianthus Allwoodii Rachel. — Pink.

D. Giant Flowered Frilled Single. —Many colours.

D. Crimson Dwarf Semi-Double.— Maroon and crimson.

D. deltoides Brilliant.—Crimson rose.

D. Double Fiery Scarlet.—Scarlet.

D. Dwarf Large Flowered Single.— Many colours.

D. Heddewegii Crimson Belle.— Crimson.

D. H. Salmon Queen.—Salmon.

D. H. Scarlet Queen.—Scarlet.

D. H. Fringed The Mikado.— Various colours.

D. Little Jock.—Mauve and carmine.

D. Loveliness.—Mauve.

D. Lucifer.—Orange scarlet.

DIANTHUS LEAF SPOT.—See *DISEASES OF ROCK PLANTS*.

DIARY.—See *GARDEN DIARY*.

DIASCIA (Nat. Ord. Scrophulariaceæ).—One species of this genus, *D. Barberæ*, is a half-hardy annual which is well worth growing. It bears bright salmon-pink flowers from early August onwards, and averages 9–12 ins. high. It requires none but the usual culture of half-hardy annuals.

DIASTASE.—A ferment necessary for successful germination. See under FERMENTS in *GERMINATION OF SEEDS*.

DIBBERS: Their Use and Abuse. The dibber is a tool greatly used, but much abused by nine-tenths of the present-day gardeners. Its use lies in the fact that it can be used for the speedy planting of young seedlings of the cabbage tribe which have not got masses of fibrous roots. It can also be used for the speedy setting of cuttings of all kinds. For this purpose it should be very bluntly pointed—the usual dibber made of an old spade handle, and sharpened very much to a point, is not nearly so good.

The abuse of the dibber is in its use as a means of setting such seed tubers as artichokes or potatoes, for planting such crops as broccoli, cauliflowers, or indeed anything possessed of a good ball of roots. For this purpose it is worse than useless.

When such planting is done, a large cavity is left underneath the plants for the roots to form into. What happens is obvious. The roots are killed by the contact with sour air, and the plant dies speedily.

Such planting should be done with a trowel; it is more labour, but no modern gardener who means to be successful is going to shirk a bit of extra work. The modern man tells us he loves his plants. If this is true then it ought to be impossible for him to make them as unhappy as they can be by planting them carelessly with a dibber. Dibber-planting is the lazy way, the crops are "stuck in anyhow," and it needs a man with a trowel to plant them properly as they should be.—E.

DIBBLES.—See *DIBBERS.*

DICENTRA (BLEEDING HEART, etc. Nat. Ord. Papaveraceæ).—An attractive genus which may be grown out of doors in the rock garden and in the herbaceous border, as well as indoors.

Outdoor Culture.—This is not a matter of great difficulty. The plants may be grown in any good soil, but a rather warm, sunny site, sheltered from cold winds, is desirable, as also is a little winter protection. Propagate by division in March or April, or by cuttings later, and plant any time from November up to the end of March, but in cold exposed districts spring planting is recommended.

What to Grow.—The following may be included, but for many additional species larger works must be consulted :—

Dicentra canadensis.—A white, May flowering sort, about 6 ins. in height.

D. chrysantha.—A desirable yellow sort, blooming in the autumn (September), and growing about 3 ft. in height.

D. eximia.—A pretty purple-crimson species, blooming in May and June, which grows about 1 ft. high.

D. spectabilis.—This is also known as *Dielytra spectabilis.* It bears purple-crimson or darkish-red flowers in July and August, and averages about 2 ft. in height.

D. thalictrifolia.—This, the hardiest of the newer Chinese Dicentras, is a graceful yellow species, blooming in June, and growing about 1 ft. in height.—E.

DICHELOSTEMMA.—Now included in the genus *BRODIAEA.*

DICTAMNUS.—See *FRAXINELLA.*

DICTYOGRAMME.—Now included in the genus GYMNOGRAMME, for which see *FERNS AND FERN GARDENING.*

DICTYOPTERIS.—Now included in the genus POLYPODIUM, for which see *FERNS AND FERN GARDENING.*

DIDYMOGLOSSUM.—Now included in the genus HYMENOPHYLLUM, for which see *FERNS AND FERN GARDENING.*

DIELYTRA.—Now included in the genus *DICENTRA.*

DIERAMA PULCHERRIMUM.—Better known as *Sparaxis pulcherrima.* See *SPARAXIS.*

DIERVILLA.—For the best species see *SHRUBS.*

DIETERIA.—Now included in the genus *ASTER.*

DIETES.—Now included in the genus *MORAEA.*

DIGGING.— See *SOIL CULTIVATION* and *WINTER GARDEN, THE.*

DIGITALIS (FOXGLOVE. Nat. Ord. Scrophulariaceæ).—This useful genus is mentioned in several articles. The best species for general purposes are given in our article on *FOXGLOVE*; those suitable alike for general and for water garden purposes, as well as for the wild garden, being briefly described in our article *WATER GARDEN: PLANTS FOR THE,* while the medicinal value of the plant and hints on its collection and culture in this connection will be found in our article on *MEDICINAL HERBS.*

DIGITARIA.—Now included in the genus *PANICUM.*

DIGRAPHIS.—Now included in the genus *PHALARIS.*

DILIVARIA.—Now included in the genus *ACANTHUS.*

DILL (*Peucedanum graveolens*).—See *MEDICINAL HERBS* and *PEUCEDANUM.*

DIMORPHOTHECA.—See *ANNUALS, HALF HARDY: LIST OF.*

DIODONTA.—Now included in the genus *Coreopsis.*

DIOMEDES.—Now included in the genus *Narcissus.*

DIOSPYROS.—For the best species see *Trees.*

DIOTIS.—See *Cotton Weed.*

DIPLAZIUM.—Now included in the genus Asplenium, for which see *Ferns and Fern Gardening.*

DIPLOSIS.—See Pear Midge in *Insect Pests.*

DIPLOTAXIS (Rocket. Nat. Ord. Cruciferæ). — This genus, on account of its English name, is sometimes confused with the better-known genus Hesperis, as *H. matronalis* is also known as Rocket. The present genus contains a number of hardy annual species of very little value for ordinary gardens, but interesting botanically as being one of the members of the large *Cruciferæ* order.

DIPSACUS (Teasel. Nat. Ord. Dipsaceæ).—This is a genus of hardy biennial plants of very little garden value. The best garden sort is *D. pilosus,* the Shepherd's Rod. *D. Fullonum,* the Fuller's Teasel, is useful industrially, while *D. sylvestris* is the well-known Wild Teasel.

DIPTERIS.—Now included in the genus Polypodium, for which see *Ferns and Fern Gardening.*

DISA.—See *Orchids.*

DISBUDDING.

This is the removal of surplus buds, flowers, fruit, or shoots. It is not an operation the gardener can learn how to do from books. He must learn by practical experiment, or, better still, by being shown what to take or what to leave by some thoroughly experienced gardener.

DISBUDDING PEACHES. — See *Peaches*

DISEASES IN THE FRENCH GARDEN See *French Gardening.*

DISEASES, NOTIFIABLE.—See *Notifiable Diseases and Pests.*

DISEASES OF APPLES.—See *Apple Diseases.*

DISEASES OF DAFFODILS.— See Enemies and Diseases in *Daffodils.*

DISEASES OF FRUIT.—See *Apple Diseases; Diseases of Plants; Orchard: Making and Management of;* and *Tomato Diseases.*

DISEASES OF PLANTS.

The following notes contain descriptions of the various diseases which attack the gardener's plants. Remedies are given when known. Owing to the large amount of ground to cover, notes on individual maladies are necessarily brief. Where there are several important diseases which attack a certain plant, they are dealt with in a separate article after the article on the cultivation of that plant. For instance, the rose is attacked by Rose Canker, Rose Rust, Rose Mildew, and one or two other diseases. These will be found described with their cures in a separate article on *Rose Diseases.* The same applies to diseases of apples; we give them a separate article, *Apple Diseases.* Many apple diseases also attack pear trees, but the cures and remedies are the same for both.

It should not be forgotten that certain diseases are scheduled as notifiable under the Destructive Insects and Pests Acts of 1877 and 1907. Neglect to report them renders the gardener liable to a heavy fine. The most common of the notifiable diseases is Potato Wart Disease or Black Scab. The present writer hopes that before many years are past the authorities will realise the wisdom of scheduling Clubroot as a notifiable disease. The annual amount of damage this disease does must total many millions of cabbages, at a cost of thousands of pounds. It is a plague, and will continue to be one until proper steps are taken to check it.

The best general method of keeping down diseases is thorough clean cultivation. We shall not enlarge on the meaning of this term here, but gardeners should take it in the broadest sense. Following these few remarks are notes on the chief diseases.[1]—EDITOR.

Anemone Rust (*Aecidum punctatum*). — A common disease in *Anemone coronaria*, and readily recognised by the large and very numerous cluster-cups on the leaves and stalks. The mycelium of the fungus is perennial in the rootstock and does not kill the host-plant. The alternate stage is the Plum Rust (*Puccinia pruni*), but in gardens the two fungi appear to occur independently.

REMEDIES. — Affected plants should be removed and destroyed.

Asparagus Rust (*Puccinia Asparagi*).—The cluster-cup stage of the fungus is rare, but the brown summer stage injures the stems that are left after the crop is cut, and by autumn they may be completely blackened. When the plants are severely attacked in this way the crowns are greatly weakened. The disease is not usually persistent, but sporadic.

REMEDIES.—To prevent a repetition of infection, spores must not be permitted to reach the ground. Diseased stems, therefore, must be cut out and burned before they die off. Very badly attacked plants are best entirely removed and destroyed.

Azalea Leaf Blister (*Exobasidium rhododendri*).—This fungus causes the leaves of Indian Azaleas to become deformed and swollen, or forms roundish red and pinkish galls. The plants are disfigured, but the disease is seldom severe.

REMEDIES.—Affected leaves should be removed and burnt.

Bacterial Diseases.—Diseases of plants caused by bacteria are happily comparatively few, but several serious instances are known in Britain, such as Crown Gall, Blackleg of Potato, White Rot of Turnip and Swede, and Black Rot of the Cabbage Family. In addition, the tomato, iris, culinary pea, celery, and bulbs are sometimes attacked by bacteria. Bacteria are exceedingly minute organisms and devoid of mycelium. They multiply very rapidly and occur in enormous numbers, hence the amount of destruction they accomplish is considerable, and in the case of "soft-rot" this takes place with great rapidity. The general appearance produced by a bacterial disease is very similar to that due to fungi, and, except to the fully-trained eye, impossible to distinguish with certainty.

Bean Pod Canker (*Colletotrichum lindemuthianum*).—This appears on pods of French beans and scarlet runners as brown sunken patches, through which the disease may penetrate to the beans, infecting the seed for next season. The fungus usually first affects the young shoots, but is inconspicuous and hence is often overlooked.

REMEDIES.—It is most important only to use clean seed from unaffected crops. When the disease first shows itself, all affected portions should be cut off and burned to prevent it spreading.

Bean Rust (*Uromyces fabae*).—Bean Rust is exceedingly common on the broad bean and horse bean, and is found also on wild vetches. The brown spore-pustules are only too familiar on the leaves and shoots, and the spores often occur in such immense profusion as to coat whole plants with a fine dust-like powder. The autumn or resting spores occur as black streaks on the stems.

---

[1] Mr A. D. Cotton, the writer of the notes on *DISEASES*, wishes to acknowledge his indebtedness to Mrs N. L. Alcock for her help in preparing this article.—EDITOR.

REMEDIES.—The disease is not easy to control. (1) Burn and destroy all diseased material in autumn. (2) Select a new site the following year, as resting spores are sure to be present in the soil.

Beech Root Rot (*Armillaria mellea*).—This parasite, known also as HONEY FUNGUS, is very injurious to broad-leaved trees, especially to beech, and occasionally also to conifers. It is recognised by the honey-coloured toad-stools which arise from the root, and the strands of mycelium, at first white and later black, which run up the trunk within the bark.

REMEDIES.—Affected trees should be isolated by a trench 1 ft. deep, and diseased portions cut out. Dead trees should be cut down and removed.

Black Currant Rust (*Cronartium ribicola*).—The other stage of this rust occurs on Weymouth pines, which it attacks very seriously and eventually kills. The rust spreads easily to currants when grown in the vicinity, but only in a few seasons does it seriously injure them. It may be recognised by the yellow pustule on the back of the leaves.

REMEDIES.—Remove currants as far as possible from the neighbourhood of affected pines (which, if badly attacked, should be cut down), and spray with weak lime sulphur (1 part to 50 parts of water) if the disease threatens to be serious.

Black Rot of Cabbage and Cauliflower (*Pseudomonas campestris*).—The symptoms of this disease are the presence of black specks and streaks in the stems and leaves, coupled with the fading of the leaves. If attacked when young the plants often die. The disease is frequent in moist localities, and it attacks various cruciferous crops, especially those descended from rape.

REMEDIES.—Burn all diseased plants and stalks, and by means of a long rotation avoid using affected land.

Botrytis Cinerea.—This fungus is the exceedingly common grey mould found on all kinds of decaying vegetation when under damp conditions, both outdoors and under glass. Though usually a harmless saprophyte, it occasionally becomes parasitic, when it attacks living plants, especially bulbs, paeonies, geraniums, lettuces, and certain shrubs. The fungus forms a resting-stage, namely the small black bodies termed *sclerotia* found in the dead tissues of the attacked bulb or other plant. These perpetuate the fungus in the soil.

REMEDIES.—Strict cleanliness, the removal of all refuse and diseased parts, and the admission of plenty of light and air will greatly reduce attacks.

Canker Diseases.—Canker is a term employed by gardeners to express an open wound in the stem or flesh of a plant, and may be caused in a variety of ways. See under Canker of Apple, Bean-pod, Cucumber, Larch, Parsnip, Rose, and Tomato in this article, and in those on *APPLE DISEASES*, *ROSE DISEASES*, and *TOMATO DISEASES*.

Carnation Rust (*Uromyces caryophyllinus*).—This rust is apt to cause considerable damage, especially to plants under glass. The spore pustules (which are cinnamon-coloured) occur in pale areas on the leaves and are often found in clusters. Some varieties are apt to suffer badly.

REMEDIES.—(1) Remove affected

leaves. (2) Give plenty of ventilation. (3) If the rust is serious, spray with a weak fungicide to protect plants not attacked.

Celery Leaf Spot (*Septoria apii*).—This causes extensive damage, and should be dealt with directly it is discovered. Small discoloured patches appear on the leaf, which rapidly increase in size, and finally the whole leaf turns blackish and wilts. Minute black spots are found on the diseased leaves, and these contain the spores of the fungus.

Remedies.—Spray with Bordeaux or Burgundy Mixture two or three times in early summer as a preventive. In autumn, diseased foliage and stalks should be burned and not left to contaminate the soil. The fungus occurs on the seed, and thus the disease is perpetuated, hence it is important to use only seed from healthy plants.

Cherry Leaf-Scorch (*Gnomonia erythrostoma*).—Cherry trees attacked by leaf-scorch can be easily recognised in the winter and early spring by their dead leaves hanging persistently on the boughs. The fungus winters in the diseased leaves, ready to infect the young foliage and fruit in spring.

Remedies.—Pick off every diseased leaf in the winter, or spray thoroughly with Bordeaux Mixture first just before the flowers open, and again just after the petals fall.

Cherry Scab (*Fusicladium cerasi*).—This closely resembles the well-known scab on apples. Black or olive-green spots appear on the cherries, which, if attacked early, remain stunted and do not mature.

Remedies.—Spray with Bordeaux Mixture, or if scorching is feared spray with lime sulphur.

Chlorosis.—A physiological condition in plants indicating lack of chlorophyll is termed chlorosis. The leaves lose their normal colour and become pale or mottled with yellow. The exact causes are not fully understood, but it is known that lack of iron in the soil and occasionally excess of lime is liable to bring it about.

Remedies.—Dressing the soil with crushed sulphate of iron at the rate of ½ oz. per square yard, or watering pot plants with a weak solution of the same substance, often restores normal health.

Chrysanthemum Mildew (*Oidium Chrysanthemi*).—This is very widely distributed and common. It occurs outside, but usually causes most trouble after the plants have been brought indoors.

Remedies.—The mildew may be kept in check by supplying abundant air, by applications of finely precipitated sulphur or "flowers" of sulphur, or by the use of a sulphur vaporiser.

Chrysanthemum Rust (*Puccinia Chrysanthemi*).—This rust was probably introduced from Japan with chrysanthemum plants about 1895, and, for the first eight or ten years after its introduction, spread with great rapidity and caused much damage. Recently the fungus has been much less prevalent.

Remedies. — Select resistant varieties, and take care to avoid purchasing infected stock. Spray with dilute Bordeaux Mixture as soon as attacks are noticed, and remove very badly infected leaves.

Clubroot: Finger-and-Toe, or Anbury (*Plasmodiophora Brassicæ*).—This is caused by a microscopic fungus which attacks the roots of Cruciferous plants, such as cabbage, cauliflower, turnip, radish, wallflowers, and stocks, also weeds, such as shepherd's purse and charlock. It produces irregular swellings and knotted distortions of varying size. Somewhat similar swellings are caused by the turnip gall-weevil, but these can be distinguished from clubroot by their rounded shape, and by the presence of a grub on cutting open. Affected plants become sickly and dwarfed. The fungus can remain alive in the soil for three years or more.

REMEDIES.—The only certain remedy is the application of lime in good quantity. Clubroot flourishes in a sour soil. Freshly-slaked and finely-divided lime should be applied and well dug in. Where the disease is bad, 1–2 lb. of lime per square yard, or 1½–4 tons per acre, is not too much. Chalk may be used if well crushed up, and should be given in double quantity. After five years lime should be applied again. Acid manures, such as superphosphate and sulphate of ammonia, should be avoided, and basic slag, nitrate of soda, or bone-meal employed. Care should be taken to avoid infecting clean land. All diseased roots should be burned, and clubbed seedlings should not be planted out. Cruciferous weeds of all kinds should be exterminated.

Cluster Cup Fungi.—These fungi are so named from the fact that the spores are borne in minute cups, which occur in definite colonies or clusters on the leaf or stem. They represent a stage in the life-history of the *RUST FUNGI* (see separate article), and typical examples are found in the Anemone and Viola Rusts. For fuller details see *RUST FUNGI*, and also under the respective hosts.

Conifer Root Rot (*Fomes annosus*).—A very destructive fungus disease of conifers, especially larches. It is recognised by the white mycelium between the bark and the wood, and by the small cushion-shaped fruiting bodies on the roots or around the base. The disease spreads through the soil.

REMEDIES.—Dead trees should be cut down and removed, especial care being taken to remove the roots. Affected trees should be isolated by a trench 1 ft. deep, and diseased portions cut away.

Coral Spot (*Nectria cinnabarina*).—A common saprophyte on deciduous trees and shrubs, but sometimes also parasitic. It attacks gooseberries, currants, and other woody plants, entering by a wound or dead twigs. The pink-coloured masses of spores on the wood are conspicuous and very distinctive.

REMEDY.—Cut back to sound wood, and burn all diseased branches.

Crown Gall (*Bacillus tumaefaciens*). This disease (which has been referred to the action of this bacillus in America) forms large woody lumps, varying in size from a walnut to a child's head, on the roots of the plants. It occurs specially in young fruit stock, apples and plums suffering frequently and occasionally being killed off. In most cases the trees continue to live for some years. In this country the disease has never been thoroughly investigated, nor does it appear to cause much damage.

REMEDIES.—Diseased roots should be cut off and burned, and badly affected plants grubbed up and destroyed. Care should be exercised in purchasing young stock to avoid affected trees.

Cucumber Leaf Blotch Diseases (*Cercospora melonis* and *Colletotrichum oligochaetum*).—These two fungi, which resemble one another in the effect they produce, are occasionally very destructive to cucumbers under glass. The spots are at first small, but soon increase in size. The second fungus mentioned sometimes attacks the shoots in addition to the leaves. The affected areas bear masses of spores which readily spread the disease.

REMEDIES.—Diseased portions should be cut out and burned, and the atmosphere kept on the dry side. Spraying is not usually very successful, the only real preventive being in the selection of varieties immune to the disease.

Currant Leaf Spot (*Gloeosporium ribis*).—This produces blotches on the leaves, and studs them with small raised spots on the upper surface. The spots represent spore pustules. In severe cases the leaves fall prematurely and the tree is weakened. Gooseberries also are attacked by the same fungus.

Remedies.—Spraying with Bordeaux Mixture early in the season will prevent the disease obtaining a foothold.

Damping Off (*Pythium De Baryanum*).—A disease only too well known, and caused as a rule by the minute soil fungus *Pythium.* Affected plants fall over and die. The fungus forms resting spores, which persist in the soil, and under suitable conditions these germinate and attack young plants.

Remedies.—Sow thinly; avoid damp, shady, close conditions; and use open, porous soil. When the disease is troublesome and occurs repeatedly, use only sterilised soil for sowing (sterilised either by heating to 150° F., or by formalin). As soon as the disease shows, remove affected plants with the surrounding soil, and sprinkle the seed pan with "flowers" of sulphur.

Euonymus Mildew (*Oidium Euonymi-japonicae*).—The leaves of the Japanese Euonymus especially near the sea are often affected with this fungus, which forms a very conspicuous white mildew. The fungus hibernates on the affected leaves and in lateral buds.

Remedies.—In mild attacks dust repeatedly with "flowers" of sulphur; in bad attacks cut affected shoots hard back in spring before growth commences, so as to remove all resting mycelium. Thin out shoots if bushes are very thick.

Fairy Rings.—The name given to the dark green circles that are found on lawns and poor pastures. In this country *Marasmius oreades* is most usually the cause. The fungus, starting from a centre, grows outwards in a circular manner, and after rains in summer and autumn, develops fruiting bodies (toadstools) at the edge, thus making the ring more obvious. Inside the circle the soil is impoverished, but just at the ring the death of the fungus tissues increases the available plant food, and the grass grows stronger. The fungus itself is partly parasitic on the grass, and just outside the ring of darker green the grass is lighter and poorer. The ring grows outwards to the untouched grass year by year, and increases in size.

Remedy.—Apply lime or basic slag at the rate of 4 oz. per sq. yard.

Fasciation.—The abnormal growth and fusion of parts in a shoot, forming a swollen, flattened structure, is termed "fasciation." It is a phenomenon common to all classes of plants. These extraordinary growths may occur in circumstances of extra rich soil, or extra moisture, and can sometimes be continued, if the same conditions are maintained, as for example the cockscomb-like inflorescence of celosia and the abnormal head of cultivated cauliflower. The fasciated appearance of witches' brooms on birches and fir trees is due in most cases to the stimulus of fungus or insect attacks.

Gooseberry Die Back (*Botrytis cinerea*). — The Dying-back of branches either large or small is a common occurrence in gooseberry. It is usually due to the fungus

Botrytis, but at other times no fungus is discernible, and the death is due to other causes. When attacked by Botrytis the grey spore-tufts of the fungus may usually be seen protruding through the bark.

REMEDY.—In either case the dead branches should be cut off, and if Botrytis is the cause, great care should be taken to cut back to sound wood and to burn the dead branches.

Gooseberry Mildew, American (*Sphaerotheca mors-uvæ*).—A serious disease of gooseberries which, when present in severe form, spoils the fruit, checks growth, and renders cultivation quite unprofitable. It may be recognised by the dense white mildew on the berries and young shoots, which soon turns to a thin fine felt, pale to dark brown in colour. The fine felt is the mycelium of the fungus in which the winter-spores are embedded.

TREATMENT. — Infected twigs should be cut out and burned in early autumn, before the spores fall from the felted mildew. In the spring (at the end of April), spray with lime sulphur, using the summer strength (1 part to 30 parts of water), and spray again after three weeks' interval. For the varieties *Lancashire Lad* and *Crown Bob*, double as much water is required.

Gooseberry Mildew, European (*Microsphaera grossulariae*).—Compared with the American mildew this disease is practically harmless. The fungus appears as a sparse white mildew on the leaves, especially when grown in the shade. In cases of severe attack it causes defoliation, which weakens the shoots and may bring about their death. Rusting spores are produced on the leaves in the autumn, which provide for fresh infection in the spring.

REMEDIES.—When an attack is feared, spray repeatedly with lime sulphur (1 part to 60 parts of water). Collect and burn fallen leaves in the autumn, and dig over soil under the bushes.

Grape Rot (*Gloeosporium ampelophagum*).—A fungus disease attacking the berries, leaves, and young shoots of the vine. On the berries the fungus causes characteristic circular spots with a well-defined border. On the young twigs it causes blackening and canker-like wounds.

REMEDIES.—Remove and burn all diseased parts. Dust the leaves and flowers with "flowers" of sulphur mixed with a small amount of powdered quicklime. Repeat, if necessary, every ten days.

Grapes, Shanking of.—A non-parasitic disease characterised by shrivelling of the stalk of the berries during the stoning period, which causes the latter to dry up and decay. The trouble usually indicates unhealthy root-action such as might be caused through the roots reaching an unsuitable soil, or through the border being too wet or excessively manured. Severe scalding or sudden defoliation may also bring about shanking. The remedy lies in rectifying the conditions noted above, and encouraging healthy root-action.

Gummosis or Gumming.—Stone-fruit trees of all kinds, if wounded in any way, will produce and exude abnormal amounts of gum. This exudation may be caused by mechanical injuries such as bruising, pruning wounds, frost, cracks, and insect or fungous injuries. Occasionally gum is formed in internal pockets in the tissue of the tree, or a kernel may fail to develop and be replaced by a gum deposit. The full explanation of gumming is little understood, and the whole subject is in need of much further investigation.

Hollyhock Rust (*Puccinia Malvacearum*).—This Rust once made the cultivation of hollyhocks almost impossible, but though always more or less present, it is now much less virulent. The spore-clusters of the fungus occur as hard brown warts on the under side of the leaves and as elongated streaks on the stems.

REMEDIES.—Burn diseased leaves and stems in the autumn. Use clean seed, and sow and plant out in a new site. Choice varieties may be sprayed with a fungicide such as liver of sulphur, as a preventive, from spring onwards. Destroy affected malvaceous weeds.

Intumescences.—These are minute warts usually termed SAP WARTS by gardeners. They are not caused by fungus parasites, nor (unless insect galls be included) by insects, but by a disturbance in the transpiration of the plants. They are common on vines and pelargoniums in greenhouses, when the atmosphere is kept very moist and warm.

Larch Canker (*Dasyscypha calycina*).—A most destructive disease, which causes the branches to die off and which forms open cankerous wounds on the main stems and larger branches. Young trees are often killed.

REMEDIES.—The fungus enters the tree by means of small dead branches, and by injuries caused by wind, snow, or human agency. Dead branches and twigs should therefore be cut off, preferably in dry weather, and wounds pared over and tarred.

Mint Rust (*Puccinia Menthæ*).—This is very common in certain localities, especially the spring stage, which causes the stem to become swollen and deformed. The mycelium of the fungus is perennial in the rhizome, and consequently the disease reappears each season.

REMEDIES.—Affected shoots should be pulled up with as much of the rhizome as possible and burned. If this is done repeatedly, the disease may often be eradicated; if, however, it cannot be exterminated by this means, and is still troublesome, the whole bed should be dug up, and a new bed formed elsewhere from a fresh stock.

Mushroom Disease (*Hypomyces perniciosus*).—This attacks mushrooms growing in houses and occasionally destroys them wholesale. The mushroom does not develop normally, but forms a soft, shapeless mass, sometimes topped by a small, ill-formed cap. The parasite also attacks the spawn, causing the threads to become thick and fluffy.

REMEDIES.—The disease is difficult to deal with. It is infectious, and care must be taken to avoid carrying it to clean houses on manure or tools and boots. In bad cases all the manure should be cleared out, and a fresh start made by fumigating the house by burning sulphur.

Oak Mildew (*Oidium alphitoides*).—This conspicuous and well-known mildew only attacks oaks which have been cut back (*e.g.* hedges, coppiced oak) and seedlings. Large trees usually escape. The leaves are crippled and the shoots weakened. Winter spores are not known, but the fungus hibernates in the buds and hence reappears each season. No remedy is known.

Orchid Spot Disease.—The so-called Spot Disease of Orchids is familiar to all growers, though the cause has never been thoroughly explained. It is found chiefly on Cattleya, Dendrobium, Masdevallia, Odontoglossum, Phalaeonopsis, and Vanda. The trouble commences as dark spots, often sunken, which increase in size and number. These soon join up and form large, irregular blotches leading to the destruction of the whole leaf. No fungus can be found, the dark colour being largely due to accumulation of tannin. It is believed that Spot is in some cases caused by a chill through drops of water remaining on the leaf with a falling temperature, but in other cases this does not explain its origin, and the cause remains obscure. No satisfactory cure is known.

Parsnip Canker.—The decay on the shoulder of the parsnip root known as "Canker" or "Rust" is not due to a fungus parasite but to injuries of various kinds, such as growth-cracks, or to the work of slugs or carrot fly. These injuries do not heal, but permit the entrance of fungi, bacteria, and insects, which set up decay. Cracking, a frequent cause in bad cases, is liable to occur in all seasons and localities, but is worse when the late summer is wet and when much nitrogenous manure has been used.

REMEDIES.—(1) Dressing the land with lime previous to sowing, and applying salt at the rate of about 20 lb. per 5 rods, checks cracking. (2) Sow later, since parsnips sown in April or beginning of May, though not so large, crack less than those sown earlier. (3) Apply potash manures, which are useful for ensuring strong plants.

Pea Mildew (*Erysiphe polygoni*).—A very common disease of peas characterised by the presence of a copious white mildew on the haulm, and as a result a yellowing of the plants and early death. The damage is most severe in dry seasons and on light soils, and as a rule the mildew occurs more commonly on late peas. The winter fruits of the fungus are visible in late summer as black specks on the under side of the leaves.

REMEDIES.—Since drought undoubtedly favours the mildew, the best preventive is a good deep-rooting medium. Mulch, especially if the season is dry. In order to destroy resting spores, all diseased haulm should be collected and burned in the autumn.

Pea Streak (*Pseudomonas seminum*).—This expression denotes certain troubles which produce pale or dark streaks in the haulm of peas. In sweet peas the streak is usually pale, and since the cause is still obscure, no real remedy is known. In culinary peas the trouble is due to the bacterium *Pseudomonas seminum*. The discoloration is dark, and is seen in the stem, leaves, pods, and peas, in the tissues of all of which bacteria may be found. Affected plants die early and in any case produce practically no crop. Streak is mostly carried from season to season by means of affected seed, and occurs in many varieties of both dwarf and tall varieties of peas.

REMEDIES.—Great care should be exercised not to save seed from affected plants. These are therefore best pulled up as soon as noticed. All diseased haulm should be burned. The best seed should be purchased and sown preferably on a site where streak has not occurred. Good cultivation with a sufficiency of lime should be given.

Pear Leaf Cluster Cup (*Gymnosporangium clavariaeforme*).—The fungus genus *Gymnosporangium* requires two host-plants, living part of its annual cycle on rosaceous plants and a part on species of juniper. The large yellow cluster cups on the pear arise from spores produced by the juniper, and may be so abundant as to injure the tree. Gymnosporangium also occurs on hawthorn, medlar, and rowan. The remedy in each case is to remove the swollen diseased branches of the juniper.

Plum Rust (*Puccinia pruni*).—This leads sometimes to extensive defoliation of plum trees especially in Victorias. The under surface of the leaf is covered with brown powdery spots which in bad cases cause them to turn yellow.

Remedies.—The disease is seldom sufficient to require treatment, but spraying with dilute Bordeaux Mixture has been found useful.

Polyporus Diseases.—Various species of the fungus genus *Polyporus* attack trees and cause damage, especially in the case of old specimens. As these are often of value, care should be taken to prevent the entrance of such fungi by sawing off close to the trunk any branches which become broken off, and by tarring over all these and other wounds made on the trees. The mycelium of these fungi spreads widely on the trees, but if diseased branches are sawn off as soon as noticed the remainder of the tree may sometimes be saved.

Reversion in Black Currant.—This serious disease of black currants, also known as "Running off," is characterised by the production of sharp-pointed narrow leaves, "bunching" of the shoots, and "running off" of the fruit. The latter term indicating that, when the crops should be ripe, few or no berries are produced on the string. The precise cause or causes of Reversion are not known, but it is believed that in some cases it is induced by the repeated destruction of the terminal bud such as would follow attacks of currant mite (big bud). Although Reversion frequently follows and accompanies big bud, it is clear that the latter alone cannot always be responsible.

Remedies.—The only suggestions which can be made are to select varieties least subject to attacks, and never to propagate from affected bushes. Diseased bushes should be dug up and destroyed at once as they never recover.

Sclerotinia Diseases (*Sclerotinia sclerotiorum*).—In the fungus genus *Sclerotinia* is one species (*S. sclerotiorum*) which attacks a considerable variety of plants—viz. potato haulm, sunflowers, marrows, carrots in store, and other plants. Fortunately its occurrence is sporadic and local, but being a dangerous parasite, it occasions when present serious loss. Diseased patches are recognisable by the presence of copious white mycelium which is followed by the production of large, hard, white, and then black sclerotia, or resting bodies.

Remedies.—Drastic measures are necessary to prevent the disease spreading, and the sclerotia from reaching the soil. All diseased material should, as far as possible, be cut off or collected and burned. The application of lime to the soil is useless so far as destruction of these diseases is concerned, hence crops likely to be affected should not be grown on contaminated soil.

Silver Leaf (*Stereum purpureum*).—A disease affecting rosaceous trees and shrubs, especially apples and plums. Victoria and Czar plums suffer severely, and the former have been killed off in large numbers in parts of England. The disease is characterised by the silvery or leaden appearance of the foliage, a phase which is followed by the death of the affected branches. The fungus causing the disease enters through wounds, and attacks the inner tissues of the stem and branches; it is not visible externally until these are killed, when it appears as purple incrustations on the bark.

Remedies.—All dead trees or dead boughs should be removed and burned as soon as, or before, the fructification of the fungus appears, so as to avoid further infection. In cutting back, sound wood should always be reached and the wounds made protected by tar.

Sooty Blotch (*Leptothyrium pomi*).—Sooty Blotch causes large blackish blotches on ripe and nearly ripe apples, as if marked with a dark mildew. The fungus is quite superficial, though it spoils the appearance of the fruit. The trouble is more prevalent in damp summers, and occasionally develops extensively in autumn. Affected apples may be cleansed by firmly rubbing with a damp cloth.

Sooty Moulds.—The fungi, *Capnodium*, *Fumago*, *Meliola*, and certain allied genera, all of which possess a black creeping mycelium, are sometimes classed together as "sooty moulds." These as a rule are only troublesome in gardens where aphis or scale insects are prevalent, as they thrive on "honey dew" and cover the leaves with a black mould where this substance is present. (See article on *HONEY DEW*.)

Strawberry Leaf Spot (*Sphaerella fragariae*).—A very frequent complaint of strawberries which, however, only causes damage when the leaves are very seriously crippled. The spots are, as a rule, red or purplish with a grey centre, but they vary in appearance as other fungi besides Sphaerella cause similar spotting and are often present.

REMEDIES.—Dusting with black sulphur or "flowers" of sulphur checks the spread of the disease. In bad cases the tops may be mown in summer and the leaves raked off and burned.

Strawberry Mildew (*Sphaerotheca humuli*). — This fungus is very common on strawberries, sometimes only attacking the leaves, but at other times also the fruit, and especially in some varieties, causing much loss of crop or even total destruction. Both old and young fruit may be attacked. Affected leaves curl over and show their pink under-surface covered with mildew.

REMEDIES.—Dusting with black sulphur or "flowers" of sulphur early in the season, from mid-May, and repeating the operation at intervals of a fortnight if necessary, will often hold the mildew completely in check. For this purpose a "sulphurator" should be used, or a coarse canvas bag tied to the end of a stick from which the sulphur may easily be dusted.

Sycamore Leaf Blotch (*Rhytisma acerina*). — A very common and well-known fungus disease of the common Sycamore (*Acer Pseudoplatanus*), and other species of Acer. The fungus forms pitch black blotches on the foliage which disfigures the trees, and in bad cases causes premature leaf-fall, greatly weakening the wood. The disease commences in spring, arising from resting spores blown from the old diseased leaves of the previous season lying on the ground.

REMEDY. — A determined effort to collect and burn diseased leaves in the autumn is the only known method of reducing the attack.

Vine Mildew or Powdery Mildew (of the Vine) (*Uncinula spiralis*).—A very common disease of both indoor and outdoor vines, but perhaps more destructive in the case of the former. The mildew, which is of the ordinary powdery type, covers the leaves with a thin white layer of mycelium and spores, which readily spread to the berries. No resting spores are formed in this country, but the mycelium hibernates in buds, and hence when once mildew has occurred, it is to be expected the following season, and from a few diseased shoots it easily spreads through a whole house and to vines outside. There is no doubt that attacks of mildew are greatly facilitated by faulty culture, such as too close an atmosphere on the one hand, or faulty and draughty ventilation on the other, or indeed by dryness at the root, but even under the best management it may appear, and is not always easy to deal with.

REMEDIES. — Treatment should commence early. The old plan of placing sulphur on the pipes and heating them is good, as is also dusting with sulphur, but undoubtedly the best method of checking mildew is by the use of a sulphur vaporiser. Outdoors recourse must be had to spraying with Bordeaux Mixture.

Viola Rust (*Puccinia Violæ*).—This disease is very destructive to violas and violets. The fungus has three stages. The mycelium of the first or cluster cup stage is perennial, and grows up into the shoots each season, forming deformed swollen stems with small leaves. This stage occurs in spring and early summer, when the cluster cups are found on the under side of the leaves. The other stages follow in the summer and autumn, and are destructive to violets but not usually to violas.

REMEDIES. — (1) Good ventilation and plenty of space should be given, especially when grown in frames; and (2) as the fungus is perennial in the rootstock, cuttings should not be taken from infected plants, which should be destroyed.

Wallflower Mildew (*Peronospora parasitica*).—This fungus attacks beside wallflowers, such crops as cabbages, radish, turnips, as well as other cruciferous plants. In certain seasons whole beds of seedlings may be ruined.

REMEDIES. — (1) Remove and burn badly diseased plants. Those slightly affected should have diseased portions cut off. (2) Give ample room between the young plants, as in crowded beds the disease spreads rapidly. (3) After attack choose a new site, and do not plant wallflowers in the affected bed for at least two years.

White Rust of Crucifers (*Cystopus candidus*).—A very common fungus on wild cruciferous plants, especially shepherd's purse, and also occasionally found attacking cruciferous crops such as young cabbage, savoys, radish, and other garden plants. The fungus, which is not a true rust, but one of the Lower Fungi, produces large white blisters or swellings due to masses of spores which eventually burst through the epidermis as a white powder. Resting spores are formed in the diseased tissues. It is believed that the plants are only infected during the seedling stage, and that the fungus after infecting a plant grows along with it and forms the blisters some considerable time after.

REMEDIES.—The seed-bed should be made in a dry and open position, and all shepherd's purse and other cruciferous weeds kept down. Diseased plants in the seed-bed should be removed as soon as noted. In the case of old plants, little can be done beyond removing affected leaves as far as practicable. —A. D. C.

DISEASES OF ROCK PLANTS.

Few rock plants are subject to disease, and of those that die away, in many cases the cause is to be ascribed to excessive moisture about them in winter. (See ROCK PLANTS DISLIKING DAMP, in our article on *ROCK PLANTS FOR ALL PURPOSES*.) The following plants are occasionally attacked by the diseases named :—

DIANTHUS. LEAF SPOT.—Circular pale patches, with dark spots, on the leaves. Remove and burn infected leaves; avoid watering the foliage. Spray with any good fungicide.

GENTIAN. RUST.—Leaves turn yellow, and die. Spray, or take up and burn plant.

LITHOSPERMUM. MILDEW.—Spray with a reliable fungicide.

LYCHNIS. LEAF SPOT.—See *Dianthus* above.

PRIMULA VERA (and others). LEAF SPOT.—Large white spots with tawny margin. Spray with a reliable fungicide.

SAPONARIA. LEAF SPOT.—See *Dianthus* above.

SAXIFRAGA. RUST.—Treat as for *Gentian* above.

SEMPERVIVUM. HOUSELEEK RUST.—Infected leaves are longer, narrower, and paler than others. Destroy plants, as spray does not kill the disease.

THYME. DODDER.—Leaves lose colour, and have a parasitic growth on them. Destroy plants.

VERONICA. MILDEW. — This forms dense tufts on under-surface of leaves. Destroy plants, or spray.

A good and reliable spray is sulphide of potassium, a quarter of an ounce to a gallon of water. W. J. C.

DISEASES OF ROSES.—See *ROSE DISEASES.*

DISEASES OF SWEET PEAS.—See *SWEET PEAS.*

DISEASES OF TOMATOES.—See *TOMATO DISEASES.*

DISPOSAL OF BEDDING PLANTS.—See *BEDDING PLANTS: CULTIVATION OF.*

DISSOLVED BONES.—See *BONES*, and under PHOSPHO-NITROGENOUS MANURES in *MANURES.*

DISTAFF THISTLE.—See *CARTHAMUS.*

DITTANDER (*Lepidium latifolium*).—See *LEPIDIUM.*

DITTANY OF CRETE (*Origanum Dictamnus*).—See *ORIGANUM.*

DOCK.—See *MEDICINAL HERBS, RUMEX*, and *WEEDS.*

DOCK GRUBBERS.—See under DAISY GRUBBERS in *GARDEN TOOLS.*

DOCKMACKIE (*Viburnum acerifolium*).—See *SHRUBS.*

DODDER.—See *CUSCUTA.*

DODECATHEON (AMERICAN COWSLIP.[1] Nat. Ord. Primulaceæ).—These are charming plants, with umbels of Cyclamen-like flowers. They thrive in a shady place in the rock garden, if deep, rich soil is provided, and are propagated by division of roots in the autumn. *Dodecatheon Meadia* seeds itself freely.

Rock Garden Species.—Only three species need be described here. For others which are little grown, larger works must be consulted.

Dodecatheon Jeffreyi.—Foliage in tufts. Flowers bright rose colour with yellow centre. Site, half-shade. Soil deep, rich. Flowering Period, May to July. Height, 1½ ft.

D. Lemoinei.—A hybrid between *D. Meadia* and *D. Jeffreyi* with flowers of various colours.

D. Meadia.—The easiest and best species. Flowers rosy-purple in large umbels. Site, shady. Soil, deep rich loam and peat. Flowering Period, May to June. Height, 1½ ft. The variety *album* has pure white flowers.—W. I.

DOG MANURE.

This is of little value for the garden, though not actually injurious as some gardeners imagine. It is rich in phosphates, and is best mixed with horse or farmyard manure and dug in in the usual way in the winter, but unless a pack of hounds are kept, or the garden is attached to a dogs' home, it is not usually available in sufficiently large quantities to be troubled with.—E.

---

[1] Or SHOOTING STARS of some authorities.—EDITOR.

DOG-ROSE (*Rosa canina*).—See *ROSE SPECIES*.

DOG VIOLET (*Viola canina*).—See *VIOLA SPECIES*.

DOG'S MERCURY.—See *MERCURIALIS*.

DOG'S-TAIL GRASS.—See *CYNOSURUS*.

DOG'S-TOOTH GRASS (*Agropyron caninum*).—See *AGROPYRON*.

DOG'S TOOTH VIOLETS (*Erythronium*. Nat. Ord. Liliaceæ).—Dog's Tooth Violets, or, as they are sometimes called, ADDER'S TONGUES, are a pretty, unpretending race of bulbous plants, many of which come from North America. As a rule the foliage is mottled, and the petals tend to reflex. They like partial shade, hence they may be grown in thin woodlands and in north borders. They do not do well in pots.

Culture.—They like a damp, well-drained soil, and a partially-shaded position. The bulbs must not be kept out of the ground any longer than is necessary, as they resent being moved, nor must the best results be expected at their first time of flowering. It follows that they should be left alone as long as they flower well. An annual top-dressing of a mixture of light decayed manure and peat benefits them. They are increased by offsets and by seed, which last should be thinly sown in pans in a cold frame in August, and the seedlings grown on for two years before being planted out in the open; or if room can be found, in loose soil in a cold frame where they may remain until they bloom, when the best can be marked before they are put in their permanent places.

Species and Varieties.—Some of the best are described below:—

Erythronium americanum (YELLOW ADDER'S TONGUE).—This, a shy bloomer, bears bright yellow flowers in May, on plants 6–8 ins. high.

E. Dens-canis.—This is the COMMON DOG'S TOOTH VIOLET. There are numerous colour variations, some of which are named, *e.g.* *Frans Hals* (rosy-purple); *La Caudeur* (white); and *Matador* (rose, with especially beautiful foliage). The type has dull rosy flowers. All bloom in late April or May, and grow 6–8 ins. high. They will grow quite well in sunny positions if the soil is fairly moist.

E. grandiflorum.—This, and its sub-varieties *giganteum* and *revolutum* (Syns. *E. giganteum* and *E. revolutum*) are important flowers. The type bears yellow, and the forms bear yellow, rose-pink, and white flowers from April onwards, and grow 12 ins. high. Many named sorts of the latter are available, such as *Pink Beauty* and *Watsoni*.

E. Hartwegi.—This has pale yellow flowers in April, and grows about 6 ins. high. It stands heat better than most varieties.

E. Hendersoni.—This bears pale rose-purple flowers in May, and grows 8 ins. high.

E. nuttallianum.—This bears golden-yellow flowers in late April and May, and grows 6–10 ins. high.

E. revolutum.—This nursery sort is the sub-variety *revolutum* of *E. grandiflorum*, which see.

The nomenclature of Dog's Tooth Violets is very uncertain, so buyers should be careful when placing their orders.—J. J. & E.

DOGBERRY (*Cornus sanguinea*).—See *SHRUBS*.

DOGWOOD.—A name applied to the genus CORNUS, which see in *SHRUBS*.

DOLOMITE.—See *MAGNESIA AND MAGNESIUM COMPOUNDS*. See also under LIMESTONE in *ROCKWORK*.

DONAX.—Now included in the genus *ARUNDO*.

DONDIA.—See *HACQUETIA*.

DOODIA.—For the best species and varieties see *FERNS AND FERN GARDENING*.

DORONICUM (LEOPARD'S BANE. Nat. Ord. Compositæ).—This is a highly desirable plant for the herbaceous, shrubbery, or perennial border, as well as for the wild garden. It succeeds everywhere, alike in the smokiest cities and the sunniest villages. It will do in sun or light shade, and is probably one of the earliest truly herbaceous perennials to bloom. Certainly its flowers are hard to beat for cutting in the early spring. One thing is much against it, however, and that is its property of producing severe rashes or violent eczema on those who have sensitive skins. The present writer can handle it with impunity, but in any case it must be regarded as a doubtful plant more or less poisonous, and must be used with care. Children at all events should be forbidden to touch it, and the dead flowering stems should be promptly burnt.

Culture.—This is not a matter of any great difficulty. Planting may be done any time from late October to the end of March, though early planting is essential if early flowers are desired. The plant may easily be raised from seeds sown in the usual manner described in our article on *PERENNIALS: GENERAL CULTURE OF*; in addition to which the plants may be freely propagated from root cuttings or young basal growths from the crowns in late June and July. The usual method of increase is, however, division of the rootstocks, which can be carried out in the early winter or in February. Any ordinary soil is suitable. Cut down immediately after flowering, and apply a mulch of short manure and plenty of liquid manure if a second crop of flowers is desired. Lift at least once in three years, rejecting the worn out central portion of the clumps, and replanting the stronger outer sections.

What to Grow.—There are not many sorts to choose from. We recommend the following:—

Doronicum austriacum. — This golden-yellow sort, flowering in April and May, and again in the autumn, is hardly distinguishable from *Senecio Doronicum*, popularly known as LEOPARD'S BANE. Height, about 3 ft.

D. caucasicum.—This dwarfer sort is not so good as some. It bears yellow bloom in April, and grows about 1½ ft. in height.

D. Harpur Crewe.—Probably the most popular of all Doronicums. This is a dazzling yellow sort, flowering freely from March to June, and again in the autumn. Its height is about 3 ft. It is a variety of the following:—

D. plantagineum excelsum.—This too is a popular sort, and flowers with remarkable freedom. The large daisy-like blooms are yellow, and are produced freely through March, April, and May, with a few in the autumn. The height of this sort ranges from 2½ ft. to 4 ft.—E.

DORSET HEATH (*Erica ciliaris*).—See *HEATHS*.

DORYOPTERIS.—See *Pteris palmata* in *FERNS AND FERN GARDENING*.

DORYPHORA.—See COLORADO BEETLE in *INSECT PESTS*.

DOT PLANTS.—See list of CENTRE or DOT PLANTS in *CARPET BEDDING*.

DOUBLE BINDWEED (*Calystegia hederacea fl. pl.*).—See *CLIMBING AND TRAILING PLANTS*.

DOUBLE BRAMBLE (*Rubus fruticosus fl. pl.*).—See *CLIMBING AND TRAILING PLANTS*.

DOUBLE CAMPERNEL (*Narcissus odorus plenus*).— See *NARCISSUS SPECIES*.

DOUBLE CROPPING.—See *ROTATION OF CROPS AND DOUBLE CROPPING*.

DOUBLE-FLOWERED HEATHER (*Calluna vulgaris flore pleno*).—See *HEATHS.*

DOUBLE-FLOWERING GORSE (*Ulex europaeus flore pleno*).—See *SHRUBS.*

DOUBLE HYACINTHS.—See *HYACINTH.*

DOUBLE PYRETHRUMS.—See *PYRETHRUM.*

DOUBLE or SHOW DAHLIAS.—See DAHLIA SECTIONS AND VARIETIES in *DAHLIA : CULTURE OF.*

DOUBLE SNEEZEWORT.—See *ACHILLEA.*

DOUBLE YELLOW ROCKET.—See *WINTER CRESS.*

DOUGLAS FIR (*Pseudotsuga Douglasii*). See *TREES.*

DOUGLASIA (Nat. Ord. Primulaceæ).—A beautiful Androsace-like plant, forming dark green, mat-like tufts. It thrives in moist, peaty soil, and is propagated by division in autumn or spring. It may also be grown from seeds sown in gentle heat in March.

Rock Garden Species.—Only two are usually grown. These are briefly described below :—

Douglasia laevigata. — A small, tufted plant. Flowers pink. Site, half-shade. Soil sandy peat. Flowering Period, May to June. Height, 3 ins.

D. vitaliana.—Easy to grow, making large tufts or mats. Flowers yellow. Site, half-shade. Soil gritty peat and loam. Flowering Period, May to June. Height, 3 ins.

W. I.

DOVER GRASS (*Festuca elatior*).—See *FESTUCA.*

DRABA (WHITLOW GRASS. Nat. Ord. Cruciferæ).—This is a genus of interesting and pretty rock plants easy to grow in gritty soil. They are best propagated by means of seeds sown in March. We recommend the following as being the best species :—

Draba Aizoon.—This bears dwarf tufts of sharp leaves. Flowers yellow. Site sunny ledge. Soil gritty loam. Flowering Period, March to April. Height, 3 ins.

D. bruniaefolia.—This forms large mats of evergreen leafage. Flowers yellow. Site sunny. Soil gritty. Flowering Period, May to June. Height, 3 ins.

D. dedeuna.—This is a useful tufted species. Flowers white. Site sunny. Soil gritty. Flowering Period, May to June. Height, 2 ins.

D. imbricata.—This is another pretty tufted species. Flowers yellow, on wiry stems. Site sunny. Soil gritty. Flowering Period, May to June. Height, 3 ins.

D. pyrenaica (Syn. *Petrocallis pyrenaica*).—This forms a small tuft. Flowers rose-lilac. Site sunny. Soil gritty. Flowering Period, May to June. Height, 2 ins.

W. I.

DRACOCEPHALUM.—See *DRAGON'S HEAD.*

DRACOPSIS.—Now included in the genus *RUDBECKIA.*

DRAGON'S HEAD (*Dracocephalum.* Nat. Ord. Labiatæ).—This is the popular name of a genus of hardy annual, hardy perennial, and half-hardy evergreen plants. The first and last are of comparatively little importance, so need not concern us here. The hardy perennial sorts, of which a fair number have been described, are useful in the perennial or marginal shrubbery border, also in the rock garden and the richer portions of the wild garden. Ordinary good garden soil suits them admirably, and propagation by seed or division at the usual times is not difficult. Planting may be successfully undertaken from November to March. We recommend the following :—

Dracocephalum austriacum. — A useful blue midsummer flowering sort, about 12 ins. high.

D. grandiflorum.—This is the most

difficult to cultivate. It is a blue sort, flowering in July. Height, 12 ins.

D. nutans.—Similar to *D. grandiflorum.*

D. parviflorum.—A dwarf blue July flowering sort, suitable for the rock garden, growing only 6 ins. high.

D. Ruyschiana.—A blue sort flowering in July, and growing 1½ ft. high.—E.

DRAINAGE FOR ORCHARDS.—See *ORCHARD. MAKING AND MANAGEMENT OF.*

DRAINING.

Vegetation of any kind cannot be satisfactory if the land is wet and waterlogged. Not even grass will flourish, except the coarse and useless type. Rushes will soon predominate in low-lying pastures, and moss in higher altitudes will quickly smother the finer grasses in the fields, garden, or on lawns. Plants, trees, fruits, vegetables, and flowers must have water sufficient for their needs, but an excess of it about their roots causes stagnation. Under these adverse conditions plant-life quickly loses chlorophyll or green colouring matter, and ceases to make satisfactory progress until the evil is corrected. The obvious remedy, then, is drainage in some form.

Certain soils—those full of stones as in many of the southern counties—do not require artificial drainage, because the stones are a natural means of filtration for the surface soil. Where, however, the subsoil some 18 ins. below the surface is a hard, pan-like substance (a near approach to clay but not actually so), artificial drains are of little avail. The writer knows instances where kitchen gardens, when made, were most carefully drained in the proper manner, yet at the end of twenty years not one drop of water had passed through any of them.

In such soil as this, trenching to the depth of 2 ft. or more answers the same purpose as draining, and indeed is the only means of obtaining successful crops. What is needed is the breaking up of that hard, pan-like subsoil to admit of a steady percolation of surplus water from heavy rains. If once done thoroughly, no further trouble will be experienced.

Loams overlaying clay with no useful stones as a natural surface filter, need draining either by a thorough system of pipes or open surface channels, which in some cases answer a useful purpose to get rid of water from heavy rains quickly, before it has time to percolate through the surface loam to the subsoil of clay. Thus, when preparing a plot for a large or small kitchen and fruit garden, the constitution of the soil will decide whether it is essential to success that it should be drained.

The natural lie of the soil will determine which way to lay the pipes. Ordinary land drain pipes usually 1 ft. long in various sizes are the best to use, since water percolates through the joints, which last are not, of course, fitted together too tightly. The main drain pipes should be 3 ins. in diameter, that of the supply pipes being 2 ins. The ordinary sewage or socket pipes should not be used except in the case of a main drain carrying away a constant flow of water through which the roots of trees might push their way and thus choke up the drain. In that case the joints should be closely made with cement to prevent the ingress of roots.

Laying of Drains.—Having determined the natural outlet for the water, the main drains should be marked out at about 30 yds. or 50 yds. apart. The side or supply pipes need to be about 15 yds. apart, and should be arranged in diagonal lines on either side, connecting each set with the main drains. If possible the latter should have a fall of at least 1 in. in 20 ft., or better still would be a slope of 1 ft. per 100 ft., if this can be managed, with the side drain sloping similarly. All should be truly laid with the aid of the square-edge and spirit-level.

Before filling in the drains it is well to see all are correctly laid; if there are irregular portions in the base of the drain, such may be a permanent cause of trouble, as we need hardly say water will not flow uphill by natural laws. All drains should be covered with brushwood, hedge trimmings, or other similar filtering materials, which maintain porosity so much better than closely fitting clay soil over the joints.

Draining Garden Paths.—Where a kitchen or flower garden is on the level, or nearly so, some provision should be made for getting rid quickly of surplus water.

The most simple method is to lay one 2–3 inch drain down the centre of each path, connecting each of these with short drains from catch-pits on each side of the path. These pits should be built with dry bricks; they should not be less than 9 ins. in diameter and 1 ft. deep. These sizes answer for 4-foot paths. For wider paths or for a greater quantity of water, the catch-pits should be built accordingly.

The outlet pipes should be immediately under the grating at the top of the pit, thus allowing for a greater bulk of silt in each pit. If the garden is square or rectangular, the pipes in each path will run to a main drain at the bottom, meeting them at right angles.

In the case of abruptly sloping ground, in spite of drains and well-made catch-pits, heavy rains often create a rush of water more than the drains can take. All too often the result is that gravel is washed to the lowest point of the path, choking the catch-pits in its rush, impelled by the force of the water.

The remedy for this is not to lay drains in such paths at all, but to substitute side-channels in the path on the margin. These are formed with a 2-inch layer of concrete, and are faced with gravel of the same colour as the path. The channels should be in width of a size consistent with width of the path. For a 4-foot path the channels should be 6 ins., and for a carriage drive 12½ ft. wide, 1 ft. should be left on each side. At varying distances catch-pits should be built in the channels or just off them in the margin, connecting these with drains to convey the water to a place of safety, such as a pond or tank built in a convenient site for the use of cattle, perhaps, or for the garden during a drought.—E. M.

DRAINING GARDEN PATHS.—See *DRAINING*.

DRIED BLOOD.—See ORGANIC PRODUCTS under NITROGENOUS MANURES in *MANURES*.

DRIFT.—See under DRIFT GEOLOGY in *GARDEN GEOLOGY*.

DRIFT MAPS.—See under DRIFT GEOLOGY in *GARDEN GEOLOGY*.

DROOPING GOLDEN BELL (*Forsythia suspensa*).—See *CLIMBING AND TRAILING PLANTS*.

DROPMORE ALKANET (*Anchusa italica Dropmore*).—See *ANCHUSA*.

DROPWORT (*Spiraea Filipendula*)—See *SPIRAEA*.

DROSERA.—See *SUNDEW*.

DRUMHEAD KALE.—See *BORECOLE or KALE*.

DRY MEASURE.—See under MISCELLANEOUS MEASURES in *WEIGHTS AND MEASURES*.

DRY ROT.—See *POTATO DISEASES*.

DRY WEATHER PLANTING.—See *BEDDING OUT*.

DRYAS (MOUNTAIN AVENS. Nat. Ord. Rosaceæ).—This genus of evergreen trailing plants, with shrubby stems and small oak-like leaves, thrives on half-shady ledges in the rock garden. It may be propagated by division of the roots in the spring, by cuttings out of doors in July, and also by seeds in heat in March. The two best species are :—

Dryas Drummondii (Syn. *D. chamaedryfolia*).—A trailing sort with nodding golden-yellow flowers. Site half-shade. Soil gritty loam. Flowering Period, June to July. Height, 4 ins.

D. octopetala. — A free-growing trailer with pure white flowers. Site half-shade. Soil gritty loam. Flowering Period, June to July. Height, 3 ins. Its variety *lanata* has attractive woolly leaves.—W. I.

DRYING OF FRUITS AND VEGETABLES.—A word may here be said as to the drying of one's own fruit, etc., at home, simply using the sun or oven. The former is a splendid dryer, but, unfortunately, in the greater part of this country there are seldom many successive days of hot sunshine, and artificial heat has to be resorted to. Now where an ordinary kitchen range is heated by coal, there is always a certain amount of heat which need not be allowed to waste, as it will help nicely with the drying of one's produce.

The first thing necessary is to provide some trays for drying, and these can easily be made at home by tacking together four strips of wood about 3 ins. deep, and stretching coarse muslin or canvas over the frame when finished, tacking this down. The produce about to be dried is spread on the tray, one layer deep, prior to exposing it to the heat. It is impossible to state any definite length of time required for drying special fruits, etc., as so much depends upon the sun or oven heat and for how long it is continuous. Care and patience are both required when one is conducting drying operations, and it should always be remembered that the produce is to be *dried* and *not cooked,* therefore the heat must only be gradual and never too intense, as if once the fruit becomes hardened, it will never be properly dried. The temperature should be between 160° F. and 200° F., and it is a good plan always to leave the oven door open while produce is inside, in order to avoid any danger of overheating, and also to allow the moisture to escape outwards.

When the produce is thoroughly dried, the best method of storage is to keep it in bottles or tins away from the air ; but frequent examination is advisable, and if there are any signs of damp, spread the contents again on the tray, placing it in the oven for an hour or so.

The following dry very successfully :—

Apple rings, apricots, currants, grapes (for raisins), pears (halved), and plums.

Beans and shredded carrots, peas, etc., for soups, also onions, will dry equally successfully.—E. C.

DRYING OF VEGETABLES.—See *DRYING OF FRUITS AND VEGETABLES.*

DRYING-OFF BULBS.—See *BULBS : CLEANING AND STORING.*

DRYING POULTRY DUNG.— See *POULTRY MANURE.*

DRYNARIA.—Now included in the genus POLYPODIUM, for which see *FERNS AND FERN GARDENING.*

DRYOPTERIS.—Now included in the genus NEPHRODIUM, for which see *FERNS AND FERN GARDENING.* See also FERN (MALE) in *MEDICINAL HERBS.*

DUCK FOOT.—See *PODOPHYLLUM.*

DUCK MANURE.— See *POULTRY MANURE.*

DUCK NUT.—An old variety of WALNUT. See WALNUT in *NUT CULTURE.*

DUCKWEED (*Lemna.* Nat. Ord. Lemnaceæ).—Various kinds of Duckweed often prove troublesome in stagnant ponds, pools, or lakes in the water garden, but do not as a rule grow in running water. One remedy therefore is almost obvious: avoid having stagnant water in the garden. Duckweed can generally be destroyed by rendering the water slightly acid, and a small quantity of sulphuric acid is the material usually employed. This, however, cannot be considered a safe remedy where other choice water plants are being grown, as it may have a very detrimental effect on them.

DUNG.—See various manures, *e.g.* *Cow Manure, Horse Manure, Pig Manure, Poultry Manure*, etc.

DUNG BEETLES.—See under Mushroom Pests in *Insect Pests.*

DURRA.—See *Sorghum.*

DUSTY MILLER (*Senecio Cineraria*).—See *Senecio.*

DUTCH BEANS.—These are the same as Dutch Brown Beans. See *Beans.*

DUTCH CLOVER (*Trifolium repens*).—See *Trifolium.*

DUTCH CROCUSES.—See under Species and Varieties in *Crocus.*

DUTCH HYACINTHS.—See *Hyacinth.*

DUTCH RUSHES.—See under Horsetail in *Weeds.*

DUTCHMAN'S PIPE (*Aristolochia Sipho*).—See *Climbing and Trailing Plants.*

DWALE.—See *Atropa.*

DWARF BALSAM FIR (*Abies balsamea hudsonica*).—See *Trees.*

DWARF BEANS.—See *Beans.*

DWARF BLUEBERRY (*Vaccinium parvifolium*).—See *Shrubs.*

DWARF CHERRY (*Prunus Cerasus*).—See *Trees.*

DWARF FRENCH BEANS.—The same as Dwarf Beans. See *Beans.*

DWARF GORSE (*Ulex europaeus nanus*).—See *Shrubs.*

DWARF JUNE BERRY (*Amelanchier alnifolia*).—See *Shrubs.*

DWARF KIDNEY BEANS.—The same as Dwarf Beans. See *Beans.*

DWARF NASTURTIUM (*Tropaeolum minus*).—See *Nasturtium.*

DWARF SUMACH (*Rhus copallina*).—See *Shrubs.*

DWARF WAX-POD BEANS.—See *Beans.*

DYER'S MADDER (*Rubia tinctorum*). See *Rubia.*

DYER'S-WEED (*Reseda Luteola*).—See *Reseda.*

DYER'S WOAD (*Isatis tinctoria*).—See *Isatis.*

DYERS' GREENWEED (*Genista tinctoria*).—See *Shrubs.*

E

EARWIGS.—See article on *INSECT PESTS.*

EAST LOTHIAN STOCKS.—For the best species see *STOCKS.*

EASTERN PLANE (*Platanus orientalis*).—See *TREES.*

EASTERN SPRUCE (*Picea orientalis*). See *TREES.*

ECCREMOCARPUS.—For the best species see *CLIMBING AND TRAILING PLANTS.*

ECHEVERIA.—Now included in the genus *COTYLEDON.*

ECHINACEA (Nat. Ord. Compositæ).—This is a genus of hardy herbaceous perennials of very easy culture. It will succeed in ordinary light rich loam in most districts, and is not hard to propagate by summer-sown seeds or root division in March, at which latter period it may be successfully planted. It is a favourite plant with many exhibitors of hardy flowers.

Echinacea purpurea is the best species. This bears red or reddish-purple flowers in August and September, on plants 3–4½ ft. in height.

ECHINOCACTUS.—A genus of cactaceous plants. See *CACTI.*

ECHINOCEREUS.—A genus of cactaceous plants. See *CACTI.*

ECHINOCHLOA.—Now included in the genus *PANICUM.*

ECHINOPS (Nat. Ord. Compositæ). This genus, known by some people as the GLOBE THISTLE, includes some useful hardy perennials which are very good bee plants. It may be used in the perennial border, shrub border, or even in the wild garden.

Culture.—This is simple and easy. The plant succeeds in any good garden soil in a hot sunny site, and is easy to increase by seeds sown in the usual way described in our general article on *PERENNIALS.* It may also be increased by root division in the autumn or spring, and may be planted any time from November to the first week in April.

What to Grow.—A few good sorts are named below :—

Echinops bannaticus.—By some authorities this is described as a biennial, but it will live for three years or more. It is a blue-flowered sort, in which there is some purple or violet, and blooms in July and August, averaging about a yard in height. There is a desirable white variety of this, named *albus.*

E. dahusecus.—A blue August blooming sort, averaging 3 ft. in height.

E. exaltatus.—A tall white July blooming sort, attaining 2 yds. in height.

E. graecus.—A blue sort, flowering at the same time as *E. exaltatus*, but only about 2 ft. high.

E. humilis.—A desirable dwarf blue June flowering sort, averaging 1½ ft. in height.

E. Ritro.—Undoubtedly the best sort of all. There are several varieties all blue, which bloom from June to August, and which vary in height from 2 ft. to over a yard.

E. sphaerocephalus.—A useful, light blue sort, blooming from July onwards. Its height varies from 2 ft. to 4 ft. There is a useful white variety named *albidus.*

E. tauricus.—A blue sort, flowering during August, about 1½ yds. high.

ECHINOPSIS.—A genus of cactaceous plants. See *CACTI.*

ECHTHRONEMA.—Now included in the genus *SISYRINCHIUM.*

ECOLOGY.—See *BOTANY FOR GARDENERS.*

EDELWEISS.—See *LEONTOPODIUM.*

EDGING.—See *GARDEN EDGINGS.*

EDGING BOX (*Buxus sempervirens suffruticosa*).—See *SHRUBS*.

EDGING : HALF-HARDY PLANTS FOR.—See *EDGING PLANTS : HALF-HARDY*.

EDGING : HARDY PLANTS FOR. Many fine groups of Hardy Plants are available for use as Edging Plants, and the garden-maker has a wide and varied choice when selecting.

Edgings may briefly be defined as "formal" and "informal." In the first, the plants should be as neat in growth and as uniform in blossom and colourings as possible. "Informal" plantings give the planter more scope in the choice of subjects, and are greatly preferable.

Leaving out the usual edging subjects, such as *Buxus sempervirens*, *Lavandula Spica*, shrubby Veronicas, etc. (which are really shrubs pure and simple, and therefore cannot be regarded by the simple definition of Hardy Plants), a wide choice is open to us. Some of these are mentioned below:—

Anemones such as A. blanda, Hepatica, sylvestris, etc., are charming.

Arabises such as A. alpina, alpina variegata, albida, and albida flore pleno are widely used. The albida section are very aggressive, and need constant replanting.

Armerias, or Sea Pinks, are very pleasing, especially the dwarf brightly coloured varieties.

Astilbes of the newer and more charming species and varieties are splendid for fringing informal pathways in moist places.

Aubrietias are excellent. Neat, dwarf, floriferous, and very showy in colour. Varieties like Dr Mules, Lady Marjorie, Lavender, and Triumph are very desirable, planted separately, though seedlings of a first-class strain are glorious when grown intermixed as informal edgings on the raised sides of pathways.

Campanulas are of first-rate importance. All the carpatica group are heartily recommended. C. pulla and varieties of the pumila and pusilla groups make very pleasing effects, and many of the hybrids, such as Profusion, Stansfieldi, and others, are exceedingly good.

Cerastiums, owing to their aggressive root action, cannot be recommended, unless utilised for poor, dry soils.

Corydalis—especially such forms as C. chielanthifolia and C. nobilis—make pleasing edgings.

Dianthuses are extremely serviceable. Species such as D. caesius, deltoides, etc., are charming, and the newest hybrids, which include gracilis and Rosalind, are exceptionally good.

Ericas, though hard-wooded, shrubby plants, make splendid edgings, especially E. carnea, carnea alba, and mediterranea hybrida.

Erigerons can be utilised in a large measure, especially the continuous flowering E. mucronatus.

Gentians, though so well adapted for rock garden plantings, can be used if necessary. Notable forms such as G. acaulis, acaulis alba, asclepiadea, septemfida, and verna are suitable.

Geraniums of the best hardy sorts are permissible.

Geums such as G. Heldreichii, maximum, and montanum can be utilised.

Gypsophilas, especially G. repens monstrosa and Sundermanni, are also very pleasing.

Heleniums, including H. grandiflorum and pumilum, make good edgings.

Helianthemums, or Sun Roses, can be safely relied on, especially the neater double-flowered varieties.

Heucheras one can plant freely. They are ideal, especially Beacon, Rosamunde, Scarlet Spray, St Osyth, and similar free-flowering varieties.

Hypericums, with their sheets of golden blossoms, are glorious.

Iberis is invaluable for making snowy drifts of blossom. I. correaefolia, garrexiana, sempervirens, superba, and other effective forms are ideal.

Kniphofias of the types of K. Goldelse and Torchlight are excellent.

Lithospermums, particularly L. Heavenly Blue and L. prostratum, are worthy of note.

Mimulus furnishes a wealth of varied colourings for the purpose.

Nepeta Mussini is good, especially where there is plenty of space. It can be associated with Lavender.

Phloxes of the setacea and subulata groups furnish many neat, attractive dwarf plants. P. atropurpurea, Brightness, G. F. Wilson, lilacina, Nelsoni, and others may be looked upon as especially choice subjects. The low-growing herbaceous Phloxes such as P. carolina, divaricata, divaricata alba, and Laphami are of much value and surpassing beauty.

Pinks (see also DIANTHUS) make good edging subjects, especially for formal work. Varieties such as Her Majesty, Mrs Sinkins, Progress, and Snowdrift are very desirable.

Plumbago Larpentae makes a good blue-flowered subject, very hardy and attractive *en masse*.

Polemoniums such as P. Richardsonii can be used.

Polygalas are useful for small edgings.

Primulas are capable of great effects. P. Beesiana, pulverulenta, sikkimensis, and others are grand for moist situations. The Alpine types are excellent in drier positions. P. Auricula, golden-yellow, and P. Auricula Revolution, brilliant red, are wonderfully fine.

SAXIFRAGES furnish a host of worthy subjects, ranging from the large-leaved S. Megasea to the very dwarf species such as S. apiculata, Boydii, Pseudo-sancta, Salomoni, sancta, etc.

Mossy Saxifrages are favoured for cool pathways, and of these we can heartily recommend S. Arkwrightii, Beacon, ceratophylla, Fire King, hypnoides, Red Admiral, rheimagnifica, and Wallacei as being typically useful plants.

Silver Saxifrages are best represented by such forms as S. cochlearis, Cotyledon, lantoscana superba, lingulata superba, macnabiana, etc.

Saxifraga umbrosa is widely used; it is neat, but rather short-lived in blossom. Nearly all the dwarfer species in the article on *SAXIFRAGA* can be used.

Sedums—though not equal to the Saxifrages in value—can be freely used, especially such species as S. glaucum, obtusatum, rupestre, sexangulare, spathulifolium, and spurium rubrum.

Silenes can be used, selecting the best species.

Spiraeas (like Astilbes) furnish a considerable variety of good material for bold work.

Tiarella cordifolia is good, contributing pleasing effects in drifts, with its abundant foamy blossoms.

Verbena chamaedryoides should be chosen for its brilliant scarlet colouring. Nothing exceeds it in effect, and a five years' test in an East Coast garden has proved its value and hardiness.

Veronicas of the dwarfer types offer some useful plants. V. incana, rupestris, and verbenacea, as well as the taller subsessilis, are good types, while the tiny shrubby gems such as V. Catarractae, white, and Heavenly Blue are very fine.

Vincas should only be used in cases of necessity, but are useful in shade and in poor soils.

Violas are first rate. Especially would we draw attention to V. gracilis, violet blue, and the many fine varieties and hybrids of recent origin. These are the most glorious of all edgings plants, and are hardier and more floriferous than the much esteemed florists' Violas (see the special article on *VIOLA*). All varieties are worthy of consideration for edgings.

Zauschneria californica should not be omitted. It is another grand scarlet-flowered subject, but needs the growths to be well ripened to ensure a good display of blossom.

POPULAR EDGING PLANTS.—The most popular edging plants are probably to be found among the typical hardy bedding plants, under which we note Alyssums of the saxatile type, Bellis, Cheiranthus, Myosotis, Polyanthus, Primula vulgaris, etc. (Many of the subjects preceding can also be used for bedding purposes.)

Bulbs, though out of the range of this article, are famous subjects for edgings, especially the free-flowering, dwarf-growing species and varieties, which are so largely used for rock garden planting.

Omissions.—The subject of edgings offers an immense field of study and experimental work among the Hardy Plants, and many subjects are perforce omitted from the foregoing notes which would make pleasing edging plants.

Among these one may note *Alyssum maritimum*, *Caltha palustris flore pleno* (damp places), *Coreopsis lanceolata*, *Linums* (such as *flavum*, *narbonense*, and *perenne*), *Pyrethrum hybridum*, *Trollius*, *Scabiosa caucasica*, and the dwarfer perennial *Statices*.—P. S. H.

EDGING IRONS.—See *GARDEN TOOLS*.

EDGING PLANTS, HALF-HARDY.

Half-Hardy Annuals.

Ageratums (in variety).
Asters (in variety).
Balsams (in variety).
Lobelias (dwarf).
Nasturtiums (dwarf).
Nemesias.
Petunias (in variety).
Phlox Drummondii (in variety), etc.
Portulacas (in variety).
Sedum coeruleum (in variety).

Half-Hardy Perennials.

Antirrhinums[1] (dwarf varieties).
Antirrhinums (intermediate varieties).
Begonias (Tuberous).
Begonias (Fibrous).
Echeverias (in variety).
Geraniums (Ivy).
Geraniums (Zonal).
Heliotrope (in variety).
Mesembryanthemum (in variety).
Salvias (in variety).
Verbenas, etc. P. S. H.

EDGING: ROCK PLANTS FOR.—Some are included in our article on *EDGING: HARDY PLANTS FOR.* Also see ROCK PLANTS FOR EDGING in *ROCK PLANTS FOR ALL PURPOSES.*

EDIBLE FUNGI.—See *FUNGI: EDIBLE AND HARMFUL.*

EDRAIANTHUS.—A synonym for *WAHLENBERGIA*, which see.

EDUCATION AND GARDENING.

Does a gardener need to be specially educated? We say emphatically "Yes." The man in the street usually says "No." It must, however, be evident that whereas an uneducated lad frequently drifts into a mere "hewer of wood and drawer of water," the one who literally "knows his book" almost automatically passes into the less laborious, but more interesting and better remunerated positions. Even such manual work as digging can be performed more easily, and certainly with greater interest, if the worker is able to apply the elements of mechanism to it. The value of work done does not necessarily depend upon the amount of muscular energy expended, but upon its utility. Ground does not usually require digging in March in the same way as in November. It is necessary to determine what is desired, and the means of thorough accomplishment with the minimum fatigue. To obtain such results a really good education for the organiser is indispensable, and the labourer should have, at least, a rational one.

---

[1] Antirrhinums are listed as Half-Hardy subjects; but ofttimes they may almost be regarded as Hardy Plants.

We do not mean that a College education is essential for a successful gardener. Why should it be ? College courses are designed for organised progress. Examination honours are obtained with comparative ease by College students, and together with the almost certain influence of the " Powers that be," give such students immense starting advantages in the race for positions. Discussions with other students are invaluable. Innumerable difficulties crop up which questions and answers from a good instructor would quickly clear. For these reasons youth should, if possible, avail himself or herself of the many scholarships now offered to study at one of the Colleges.

Self-education is likely to be less well directed. Time is lost through not making a good selection of subjects, or properly allotting time to the study of each. The self-educated student also lacks the training requisite suitably to marshal his knowledge to please examiners. This, however, he can to a large extent get over by correspondence. Finally, the self-educated student has to compete against the influence of "Friends at Court," as College authorities frequently are. Justice to others is not always sufficiently pronounced to outweigh a natural prejudice in favour of a personal friend. On the other hand, a lad who cannot go to College, but has a persevering determination " to win through," and well arranges his studies, making the utmost of his time and abilities, may reasonably hope to succeed ultimately. The chances of his giving up in despair are great, but the certainty of a glorious triumph is assured if he persistently pursues his upward course. Indeed, having been successful through the " Mill of Difficulties," he is the man who will make his mark. The world wants independent thinkers, who will later bring their life's experiences into hotchpotch. The co-operation of even a few really good self-educated persons will beneficially leaven large numbers of College-trained individuals, who have necessarily followed more or less in the prescribed groove.

Avoid Specialising.—A self-educated youth must take the utmost care not to specialise too soon. There is very great danger that he will do so, for he may become particularly interested in one thing, as, for instance, hybridising, and he reads all available books on the subject, and probably devotes much time to investigations. That is time wasted, however, as he cannot understand or appreciate fully what has been written upon the subject, nor can he winnow away the chaff from the grain of what is available. Time will be lost in doing work which a wider knowledge would show to be useless, and in any case such early specialisation will make him a very narrow or one-sided person. A thoroughly good elementary education is essential before studying any special branch of gardening. Theoretically the average lad has had a good grounding before leaving school, but experience shows that comparatively few can write a decent business letter, and still fewer can make simple calculations involving a practical knowledge of arithmetic and mensuration. Young men who have obtained high standards at school, have been quite at a loss to calculate the number of plants required for a triangular-shaped piece of ground upon which they may be standing, or to determine the approximate time and cost likely to be involved in any particular purpose. Yet such calculations can be made extremely interesting, and the usefulness is beyond words. We urge all intending gardeners to lose no time in setting to work to acquire the ability to do such things with alacrity.

What to Study.—Given a good preliminary education, what are the special subjects essential for a gardener ? Naturally we must first mention Botany, the science which, in its widest sense, teaches all about plants. The old idea of this science was that it had largely to do with difficult names, and classification figured as the most important part of Botany ; but we now rightly recognise the importance of structure and function. Indeed, so well is the importance of function now recognised, that it is sometimes considered almost a separate subject, and volumes have been written upon it under the name of *Plant Physiology*. Readers should study the article on this interesting branch of Botany which is given elsewhere in these pages. Obviously the structure of plants should be studied in conjunction with function. The raiser of new varieties, and even the grower of seeds must know all that can be learnt of the alliances of his plants. A few years ago we heard the generally excellent gardener of a well-known public personage describing his endeavours to obtain a cross between the red currant and tomato! Doubtless there have been many similar futile attempts made by those who might easily have utilised their energy with advantage. However, even the most expert may wisely refrain from expressing contempt for honest endeavours. It does occasionally happen that some unrecognised force greatly modifies expected results, and it is true that in "Nature's infinite Book of Secrecy" a very little can yet be read. Knowledge of proved facts is needed; this, combined with the ability and trained alertness to observe any unexpected variation is what is needed, and the aim and object of education.

Many gardeners have very vague ideas respecting the important science of CHEMISTRY. It has been defined by schoolboys as "the science of explosions," because by carelessly mixing wrong chemicals there is likely to be an abundance of broken glass flying about. To some persons the chemist is a person who makes filthy smells in a laboratory, or mixes materials for the purpose of blowing the roof off; to others he is merely a dispenser of pills and disgusting tasting physic in a shop. The chemistry which is of such immense use to a gardener is, however, of a very different type, dealing as it does with the composition of soils, manures, and plants, also with insecticides and fungicides. The changes undergone in soils as the result of tillage operations, how to feed plants for any particular purpose, are also among the facts which chemistry teaches a gardener. The gardener needs to know the circumstances in which he can safely, and with advantage, use nitrate of soda or sulphate of ammonia; when he should use basic slag, and when superphosphate or bones as a source of phosphate. He should know what fertilisers he can safely mix; and what should be studiously avoided. This was forcibly shown by an incident which occurred a short time ago. An organiser knew that he needed for various crops both nitrogen and phosphates. He purchased sulphate of ammonia for his nitrogen, and basic slag for his phosphates, and on leaving home one morning ordered his men to mix these thoroughly! The escaping ammonia was so overpowering that the mixers had to spend most of their time outside the shed. By making frantic dashes to do a little mixing they were able to execute their orders, and therefore rendered two valuable substances well-nigh useless by a simple mistake! Such errors have sent not a few to "that bourne from which no traveller has returned." Sound knowledge of Chemistry not only enables one to avoid such mistakes, but gives us immense power over the numerous tiny plant foes. Chemistry teaches how to destroy insect pests in thousands, and, better still, how to prevent the birth of millions. By such compounds as Bordeaux Mixture and other fungicides, plants can be safeguarded against many diseases. Rightly mixed and properly applied (which is so often not the case), the gardener can safely rest in his armchair, studying the latest news and enjoying his nicotine, assured that his plants are safely protected.

Such branches of PHYSICS as light and heat are important studies for the gardener. The management of glasshouses, and even of hotbeds, are obviously matters which he must not neglect. Ventilation, damping, and watering, a proper balancing of light and heat, are some of the many matters which this study will materially help to elucidate.

BACTERIOLOGY is a comparatively new, but tremendously important science. Countless myriads of extremely minute organisms exist in the air, water, and especially in surface soil. Of many kinds, and every imaginable function, some known as *pathogenic* are the cause of most diseases to which man and animal are liable. One of the most important of these, so far as the gardener is concerned, is the Tetanus or lock-jaw bacillus. This exists chiefly in surface soil, and its possible presence shows the desirability of promptly cleansing and disinfecting any fresh wound, however slight, which has been in contact with soil. However, most of the bacteria with which the gardener has to deal are active friends and co-workers; Nitrates, for instance, are largely formed by their aid from humus. Study of them is most necessary if cultivation is to be thoroughly successful, and the greatest possible results gained from the soil.

Besides these subjects there are others of paramount importance for the gardener to study; for instance, mathematics, geology, zoology, entomology, and other branches of natural history. We have no space here to describe the way he should take in these subjects, but only mention them as part of a gardener's education. We may point out in conclusion that many of the points mentioned will be found dealt with more fully in other articles · for instance, Botany, Chemistry, and Geology have an article to themselves, and Mathematics finds a place in our article on *Weights and Measures*. But when we realise the large amount of ground to be covered under each of these subjects, it is obvious that in the space of a few hundred words we can hardly do justice to it. The gardener who is wise, and means to gain the advantages resulting from a thorough education, should purchase one of the many cheap and excellent primers issued on all of these subjects, if he is not so fortunate as to be able to participate in a College education.—F. J. B.

EELWORM ROT.—See under Eelworms in *Insect Pests*.

EELWORMS.—See *Insect Pests*.

EGG PLANT.—See *Salad Plants* and *Solanum*.

EGLANTINE (*Rosa rubiginosa*).—See *Rose Species*.

ELAEAGNUS.—For the best species see *Climbing and Trailing Plants*, and *Shrubs*.

ELATERIDÆ.— See Wireworms in *Insect Pests*.

ELBOWIT GRASS (*Alopecurus geniculatus*).—See *Alopecurus*.

ELDER.—See *Medicinal Herbs*, also the genus Sambucus in *Trees*.

ELECAMPANE.— See *Inula* and *Medicinal Herbs*.

ELECTRICITY IN GARDENING. The application of electricity to stimulate the growth of flowers and vegetables is still in its infancy, and although when used in the hands of experts striking results have been obtained, it is too soon to say whether it will be possible for the ordinary gardener to use electricity profitably.

ELEOCHARIS (Spike Rush. Nat. Ord. Cyperaceæ).—This is a genus of hardy bog and water plants of very little garden value. The two best known species are *E. acicularis* and *E. palustris*, both of which grow about 6 ins. high.

ELEUSINE (Crab Grass. Nat. Ord. Gramineæ).—This is a genus of hardy grasses only suitable for the wild garden. *E. aristata*, *E. coracana*, *E. indica*, and *E. stricta* are cultivated at Kew. The second species grows 1½–2 ft. in height; the others about 1 ft., or rather less.

ELK'S HORN FERN (*Platycerium alcicorne*).—See *Ferns and Fern Gardening*.

ELK-WOOD (*Magnolia tripetala*).—See *Climbing and Trailing Plants* and *Trees*.

ELLIPSE-SHAPED BEDS, Area of.—See Areas of Beds and Borders in *Arithmetic and Gardening*.

ELM.—For the best varieties see Ulmus in *Trees*.

ELODEA.—See *Water Thyme*.

ELYMUS (Lyme Grass. Nat. Ord. Gramineæ).—This is a genus of coarse-growing, hardy grasses, of no garden value, though sometimes grown in the wild garden.

E. arenarius and *E. giganteus* are probably the two best species, and grow 1–2 yds. in height. *E. europaeus*, the common Wood Barley, is coarser, and may be dispensed with.

EMBOTHRIUM.—For the best species see *Climbing and Trailing Plants* and *Shrubs*.

EMBRACING MUEHLENBECKIA (*Muehlenbeckia complexa*). — See *Climbing and Trailing Plants*.

EMILIA.—See *Tassel Flower*.

ENCHANTER'S NIGHTSHADE. — A creeping perennial weed. For means of control see Bindweed in *Weeds*. See also *Circaea*.

ENCINA or ENCENO OAK (*Quercus agrifolia*).—See *Trees*.

ENDIVE (*Cichorium Endivia*. Nat. Ord. Compositæ).—This is often grown exclusively for autumn and winter use, but where desired a summer supply may be had by sowing the seed in April, the last sowing being made early in August. This crop prefers a warm situation, and should have plenty of manure added to the soil.

In sowing the seed, cover very lightly, and when large enough to handle, transfer the little plants to their permanent quarters, allowing 15 ins. between the rows, and about 8–12 ins. between the plants.

Being water-loving subjects plenty of moisture is essential, failing which the plants quickly run to seed. When fully grown, or a few weeks before wanted for use, place a large pot, tin, or slate over the hearts to ensure perfect blanching, or an equally good result often follows if the outer leaves are tied together in such a way as to ensure the heart of the plant being in perfect darkness. At the approach of very severe weather lift the most promising plants, and set them close together in a garden frame, giving plenty of ventilation when outside conditions are favourable.

Varieties. — Batavian, French Moss Curled, and Imperial are the varieties chiefly grown.—F. R. C.

[Digswell's Prize is also a very reliable variety.—EDITOR.]

See also *CICHORIUM* and *ORNAMENTAL VEGETABLES*.

ENDOSPERM. — See under LIFE-HISTORY OF FLOWERING PLANTS in *PLANT PHYSIOLOGY*.

ENEMIES, GARDEN.—See *GARDEN ENEMIES*.

ENGELMANN'S SPRUCE (*Picea Engelmanni*).—See *TREES*.

ENGINE, GARDEN.—See under WATER BARROWS in *GARDEN APPLIANCES*.

ENGLISH IVY (*Hedera Helix*).—See *CLIMBING AND TRAILING PLANTS*.

ENGLISH SNOWDROP (*Galanthus nivalis*).—See *SNOWDROP*.

ENGLISH WOOD HYACINTH (*Scilla festalis*).—See *SCILLA*.

ENKIANTHUS.—For the best species see *CLIMBING AND TRAILING PLANTS* and *SHRUBS*.

ENZYMES.—See under FERMENTS in *GERMINATION OF SEEDS*, and under FOOD STORAGE AND DIGESTION in *PLANT PHYSIOLOGY*.

EPHEMERUM.—Now included in the genus *LYSIMACHIA*.

EPICATTLEYA.—See *ORCHIDS*.

EPIDENDRUM.—See *ORCHIDS*.

EPILÆLIA.—See *ORCHIDS*.

EPILOBIUM (WILLOW HERB. Nat. Ord. Onagraceæ).—This is a large genus of hardy herbaceous perennials, the dwarfer species of which may be used in the rock garden or rock border, while *E. angustifolium* is useful in the water garden. (See article on *WATER GARDEN: PLANTS FOR THE*, under WILLOW HERB.) They are easily grown in light, rich loam, and may be increased by summer-sown seeds or division of the roots in the spring, which last is the best time for planting.

What to Grow.—We cannot attempt to mention more than a few of the best of the species which have been described. Those given below, however, include some of the very best:—

Epilobium alpestre.—Syn. *E. trigonum*, which see.

E. angustifolium (ROSE BAY).—This is a useful purple or rosy-crimson sort, flowering in July, and growing about 4–6 ft. in height. Its variety *album* is white.

E. angustissimum.—Syn. *E. Dodonaei*, below.

E. Dodonaei (Syns. *E. angustissimum* and *E. Fleischeri*).—This is a useful purple sort, blooming from June to July, and growing about 2 ft. high.

E. Fleischeri.—Syn. *E. Dodonaei*, above.

E. hirsutum.—This goes by the curious name of CODLINS AND

Cream, and does best in a moist border or in the water garden. It bears purplish flowers from July onwards, and averages 4 ft. in height.

E. longipes.—Syn. *E. pedunculare,* below.

E. obcordatum.—This is a pretty trailing species, with rose-purple flowers in the autumn, and about 6 ins. high.

E. pedunculare (Syn. *E. longipes*).—This is a dwarf-growing, prostrate species, with white, pink, or rose flowers in July.

E. trigonum (Syn. *E. alpestre*).—This bears rosy-pink flowers in July, and averages about 1½ ft. in height.

EPIMEDIUM (Barrenwort. Nat. Ord. Berberidaceæ).—This is a genus of beautiful dwarf foliage plants, which bear attractive flowers as well. Most species are easily grown in a half-shady position in sandy loam to which some peat has been added, and are propagated by division of the roots in autumn or spring. All those described below are suitable in the rock garden:—

Epimedium alpinum.—This has evergreen leaves. Flowers crimson and yellow. Flowering Period, May to July. Height, 9 ins.

E. macranthum.—The leaves of this are beautifully tinted. Flowers white, with long spurs. Flowering Period, May to July. Height, 6 ins. The variety *violaceum* has violet-coloured flowers.

E. musschianum (Syn. *E. niveum*).—This produces white flowers from May to July. Height, 6 ins.

E. pinnatum.—This is a handsome, strong-growing species, with large pinnate foliage. Flowers bright yellow, in long racemes. Site, shade. Soil ordinary loam. Flowering Period, May to July. Height, 1–2 ft.

E. rubrum.—This has beautiful tinted foliage in autumn. Flowers bright crimson and pale yellow. Site, shade. Soil, loam. Flowering Period, May to July. Height, 1 ft.

EPIPACTIS.—For the best species see *Hardy Orchids.*

EPIPHERONITIS.—See *Orchids.*

EPIPHYTIC ORCHIDS.—See *Orchids: Potting and Watering of.*

EPSOM SALTS (*Magnesium Sulphate*). See *Magnesia and Magnesium Compounds.*

EQUESTRIAN STAR.—See *Hippeastrum.*

ERAGROSTIS (Love Grass. Nat. Ord. Gramineæ).—This is a large genus of hardy or tender grasses of very easy culture. The best species is described in our article on *Ornamental Grasses.*

ERANTHIS (Winter Aconite. Nat. Ord. Ranunculaceæ).—A low growing, hardy, tuberous plant flowering very early. It thrives in any shady place, and is propagated by division in the winter.

Eranthis hyemalis.—Leaves in tufts from tubers. Flowers yellow surrounded by frill of leaflets. Soil loam. Flowering Period, January to March. Height, 3 ins.

ERCILLA.—For the best species see *Climbing and Trailing Plants.*

EREMOGONE.—Now included in the genus *Arenaria.*

EREMOSTACHYS (Nat. Ord. Labiatæ).—This is a genus of hardy herbaceous plants for the perennial parterre. It is easily propagated by seeds or root-cuttings in the usual way, and thrives in ordinary light loam. The best species is *E. laciniata,* and its varieties *flava* and *iberica* are both worthy of inclusion. They bear yellow and purple flowers from July to August, and average 4–6 ft. in height.

EREMURUS (Nat. Ord. Liliaceæ). This, known also as the Fox-tail Lily or Giant Asphodel, is a tall, stately plant, bearing a long spike of pink, white, or yellow flowers. It is hardy except in the coldest and bleakest parts of the United Kingdom. Of late years numerous hybrids have been raised. There is still a great opening for workers in this genus: first, to get more flowers open at once; and secondly, to produce a greater range of colour. In warm summers seed is freely produced.

Culture.—The roots of Eremuri are like giant starfishes, so it is not easy to send them about. They need very careful handling, as they are easily broken. Plant them 6–9 ins. deep in good rich, well-drained soil, any time from October to March. They need an annual top-dressing with light, rich compost, unless the plants are to deteriorate, as the new bud, which contains the flower spike, is produced on the top of the previous year's bud. In cold localities a winter covering of leaf-mould or cocoanut fibre is essential. Eremuri are grateful for a little overhead shade, and if possible the young growth should be protected in spring on frosty nights, removing the covering in the daytime. Seed may be sown under glass as soon as it is ripe, the young seedlings being pricked out into a cold frame, where they should remain for a year, after which they can be transferred to an open border, though they should be protected from frost until well established. All Eremuri dislike being disturbed.

What to Grow.—*Eremurus Bungei* produces yellow flowers in spikes in July, and is 2–4 ft. high. *Pallidus* (primrose), and *superbus* (clear yellow), are two good sub-varieties.

E. himalaicus bears white spikes from June onwards. Height, 6–8 ft.

E. Olgae bears white flowers marked with red, or shaded pink, and blooms in late July; its spike is 6 ft. high. *Roseus* is a charming rose-pink sub-variety, as also are *Shelford* (coppery-yellow), and *St. Michael* (buff and pink).

E. robustus produces immense spikes of rosy-pink flowers, and grows 8–10 ft. high. *Elwesianus* (pink) and *elwesianus albus* are two fine hybrids of this, full of charm, and of great vigour. All three flower in May and June.

J. J. & E. T. E.

ERICA.—See *HEATHS* and *SHRUBS*.

ERIGERON (FLEABANE. Nat. Ord. Compositæ).—This genus, chiefly of hardy herbaceous perennials, now includes other genera, such as *Stenactis*, and is most useful as a hardy border flower, as a beginner's plant, and as a subject for town gardens. It is of very easy culture, thriving under the usual treatment given to hardy perennials, and is most useful for cutting. In the case of the dwarf sorts, success may be obtained by treating as rock plants. All the species are readily raised from seeds sown in the usual way in the summer, or they may be propagated by root division in the autumn or March, which month is a suitable planting period.

What to Grow.—A very large number of species and varieties have been described, but the following contains some of the best known and most useful sorts, omitting the annuals and biennials which are of little or no importance:—

Erigeron alpinus.—This is grand for the rock garden or rock border, and bears lavender-purple flowers in July, on plants 12 ins. high.

E. aurantiacus (ORANGE DAISY).—This is a favourite rock garden species, with orange flowers from May to July, on plants 9–12 ins. high.

E. bellidifolius (Robin's Plantain).—This bears purplish flowers from June to July, and averages 1½ ft. in height.

E. canadensis (Horseweed).—This and the last species are more suitable for the shrub border than herbaceous border. The present one is doubtfully perennial, and bears white flowers from July to August, on plants 12 ins. high.

E. Coulteri.—This is a very popular border sort, bearing white flowers from June to August, and averaging 18 ins. high. *Edina* is an improved form.

E. grandiflorus.—This is a useful purple summer blooming sort, about 2 ft. high.

E. mucronatus.—This is a gem for rockwork, bearing pretty little purple flowers in June, and averaging 6 ins. in height.

E. Roylei.—This is also good for rockwork. It bears lavender-blue flowers in July, and averages 6–12 ins. in height.

E. speciosus (Fleabane).—This, and its variety *superba*, are quite the most popular sorts of all. They bear blue and mauve flowers from May to October, and average 2–3 ft. in height. There are many named garden varieties of this species flowering for the same period, and averaging the same height. The best of these include: *Asa Gray* (apricot); *Grandiflora* (deep purple); *La Grandesse* (mauve); and *Quakeress* (lavender-blue).

E. Villarsii.—This useful sort bears lilac-purple flowers from June to August, and averages 12 ins. in height.

New Varieties.

Erigeron B. Ladhams.—This bears rosy-pink flowers, and grows 3 ft. in height.

E. Elsie.—This bears rosy-lilac flowers with a dark eye, and grows 9–12 ins. high.

E. Pink Pearl.—This bears bright pink flowers and grows 3 ft. in height.

See also *Medicinal Herbs.*

ERINUS (Nat. Ord. Scrophulariaceæ).—This is a hardy evergreen rockery plant suitable for rocky crevices, old walls, and stony places. It comes up freely from self-sown seeds.

Erinus alpinus.—A small tufted species. Flowers reddish-purple. Site sunny. Soil limestone rubbish. Flowering Period, May to July. Height, 4 ins. The variety *albus* has white flowers.

ERIOCAMPA.—See under Rose Sawflies and Slugworm in *Insect Pests.*

ERIOGONUM (Woolly Knotweed. Nat. Ord. Polygonaceæ).—This genus is not grown as often as it might be, but it includes some useful hardy herbaceous perennials and rock plants. It is not hard to grow provided that a light loamy soil with some peat in it is supplied; and it is propagated in the usual way by seeds sown in the spring or summer, and by division of the roots in the autumn or spring.

Perennial Border Species. — We briefly describe a few of the best below:—

Eriogonum compositum.—A yellow or sometimes white species flowering from June onwards. Height, 12–18 ins.

E. longifolium.—A species with yellowish flowers blooming from June onwards. Height, 12–18 ins.

E. tomentosum.—This also bears yellowish flowers. They open in May and continue till July. Height about 2 ft.

Rock Garden Species.—The two described below are evergreen trailing plants suitable for a rocky bank:—

Eriogonum flavum.—A tufted plant. Leaves entirely silvery. Flowers yellow in large umbels. Site sunny. Soil gritty loam. Flowering Period, July. Height, 9 ins.

E. umbellatum.—Also tufted, and spreading. Flowers golden-yellow. Site sunny. Soil gritty loam. Flowering Period, June to July. Height, 6 ins.

ERIOGYNIA.—Now included in the genus *SPIRAEA*.

ERIOPHYES.—See BIG BUD and PEAR LEAF BLISTER MITE in *INSECT PESTS*.

ERIPHILEMA.—Now included in the genus *SISYRINCHIUM*.

ERITRICHIUM (Nat. Ord. Boragineæ.)—This is one of the loveliest of all hardy alpines, but is difficult to grow in England. It may be raised from seed sown in spring.

Eritrichium nanum.—Leaves in woolly grey tufts. Flowers brilliant blue with a yellow eye. Site half-shade. Soil grit and sandstone. Flowering Period, May to June. Height, 2 ins.

ERODIUM (HERON'S BILL. Nat. Ord. Geraniaceæ).—This is a valuable family of perennial rock plants, many with silvery foliage, and all with attractive flowers. They thrive in sunny positions, such as on rocky ledges, and are propagated by cuttings in July or by seeds in spring. We describe the seven best species below:—

Erodium amanum.—This is a tufted plant, with sub-shrubby stems and silvery leaves. Flowers pure white. Site sunny. Soil well-drained sandy loam. Flowering Period, May to August. Height, 6 ins.

E. Chrysanthum.—This also is of tufted habit, and has very silvery leaves. Flowers lemon-yellow. Site sunny. Soil sandy loam. Flowering Period, June to September. Height, 6 ins.

E. hymenodes.—This produces hairy leaves in tufts. Flowers pink. Site sunny. Soil sandy loam. Flowering Period, May to August. Height, 1 ft.

E. macradenum.—This is a splendid hardy plant. Flowers pale violet with dark blotches. Site sunny. Soil gritty. Flowering Period, June to August. Height, 6 ins.

E. petraeum (Syn. *E. guttatum*).—This has dark green leaves. Flowers white with dark blotch. Site sunny. Soil gritty. Flowering Period, June to August. Height, 4 ins.

E. supracanum.—This has silvery leaves. Flowers pink with darker lines. Site sunny. Soil gritty. Flowering Period, April to August. Height, 3 ins.

E. trichomanefolium.—This attractive sort has silvery-grey leaves. Flowers blush-white. Site sunny. Soil gritty. Flowering Period, May to September. Height, 3 ins.

ERPETION.—Now included in the genus *VIOLA*.

ERVUM.—Now included in the genus *VICIA*.

ERYNGIUM (ERYNGO, SEA HOLLY, etc. Nat. Ord. Umbelliferæ).—Although not one of the choicest subjects, the Eryngium, or SEA HOLLY, should by no means be excluded from the hardy herbaceous border, since, if not actually beautiful, it is decidedly curious and attractive. The genus includes a large number of species, some annual, biennial, and half-hardy herbaceous perennials, but all of these, being comparatively unimportant, are excluded from the present article. It is the hardy perennial species to which attention is advisable, and we describe a selection of the best at the end of the article. Roots of some species, notably *E. campestre* and *E. maritimum*, have a medicinal value, and are ofttimes candied. Cultivation of Eryngiums is not a matter of great difficulty. Ordinary sandy soil suits them in a sunny site, and propagation by summer sowings of seeds or autumn root division, is a simple matter, while success is assured if planting is done from October to March.

Perennial Border Species.—All those below are quite hardy, and need no protection. For many other species larger works should be consulted :—

Eryngium alpinum (ALPINE SEA HOLLY).—This bears blue flowers in July, and grows about 1½ ft. high.

E. amethystinum.—This pretty sort bears pale blue or steely-blue flowers in June and July, and grows about 3 ft. high.

E. campestre.—This is a commoner sort, bearing blue flowers about midsummer, and averaging 2 ft. high.

E. giganteum.—This tall sort, useful for shrub borders, bears blue flowers in July, and averages 4 ft. high. It is only biennial in some gardens.

E. glaciale.—This is a gem for rockwork. It bears pale blue flowers in July and August, and averages 3–6 ins. high.

E. maritimum (SEA HOLLY).—This is probably the most largely grown of all. It bears steel-blue flowers in July and August, and averages 1–2 ft. in height.

E. paniculatum.—This is an attractive white sort, flowering from June to August, and growing 1½ yds. high.

E. Serra.—This attractive white sort flowers in August and September, and grows 2 yds. high.

E. spinalba.—This spiny sort is more curious than beautiful. It bears white flowers in August and grows 12 ins. high.

E. yuccaefolium.—This has Yucca-like leaves (hence its name), and bears white flowers in August, and September, on plants nearly 2 yds. high.

ERYNGO.—See *ERYNGIUM.*

ERYSIMUM (PERENNIAL WALLFLOWER. Nat. Ord. Cruciferæ).—For bright colouring, hardiness, continuity of blooming, and easy cultivation, the ANNUAL ERYSIMUMS are hard to beat. In form of leaf and flower, and in habit of growth, they resemble the Wallflower, but the blooms are smaller, and the plants more branched. The plants are as easily raised from seeds as Mustard and Cress, and self-sown seedlings are usually plentiful if plants are allowed to ripen seeds. Although generally regarded as spring or early summer flowering subjects, Erysimums bloom practically all through the year if raised at various periods. For spring flowering in beds alone, or in association with bulbous flowers, these plants are most valuable and dependable. Seed should be sown in shallow drills in the spring or autumn, and the seedlings transferred to their permanent positions at an early stage of growth.

Erysimum arkansanum (correctly a variety of *E. aspersum*).—This is really a biennial, but is best treated as an annual in warm, sunny districts; it bears yellow flowers throughout the spring and summer, and averages 12–13 ins. in height.

E. perofskianum.—This bears orange flowers throughout the spring and summer, and averages 12 ins. in height.

These two species, and the improved garden forms named *Golden Gem* and *Orange Gem*, are most useful subjects for spring bedding.

Rock Garden Species.—These are early flowering, Wallflower-like plants, which are propagated by division of the roots in the spring.

Erysimum kotschyanum.—This is a small tufted perennial. Flowers rich yellow. Site sunny. Soil rocky. Flowering Period, April to May. Height, 2 ins.

E. linifolium (Syn. *Cheiranthus linifolius*).—This is biennial, with tufts of narrow leaves. Flowers dark lilac. Site sunny or half shade. Soil rocky. Flowering Period, May to August. Height, 6 ins.

E. ochroleucum (Syn. *Cheiranthus alpinus*).—This is a lovely tufted perennial plant. Flowers bright yellow. Site sunny. Soil sandy loam. Flowering Period, April to June. Height, 1 ft.

E. rupestre.—This is a spreading perennial plant. Flowers yellow. Site sunny. Soil sandy loam. Flowering Period, April to June. Height, 6 ins.—C. H. C. & W. I.

ERYTHRAEA (Nat. Ord. Gentianaceæ).—This is a small genus of pretty plants comparatively little known. The only hardy annual species worthy of note is *E. Centaurium*, a pretty native plant bearing rosy flowers in summer. It has some merit when massed in the rock garden, where it will grow 8–12 ins. high. As the COMMON CENTAURY it was formerly credited with medicinal virtues.

Perennial Border Species.—Only two are worth troubling with. These, *E. conferta* and *E. Massoni*, bear pink and rose flowers in June and July respectively, and grow 9–12 ins. high. They may be used in rock borders and require a warm, open, sunny spot, and a sandy soil. Propagation by division of the roots in the spring is the best means of increasing stock, and it is wise to delay planting till about the end of March, for the plants are not strictly hardy, requiring in exposed districts to be wintered in a frame.

ERYTHROLAENA.—Now included in the genus *CNICUS*.

ERYTHRONIUM.—See *DOG'S TOOTH VIOLETS*.

ESCALLONIA.—For the best species see *SHRUBS*.

ESCHSCHOLZIA (Nat. Ord. Papaveraceæ).—This genus is interesting horticulturally apart from the fact that it gives to our gardens a race of brilliantly flowered, easily grown plants. The name itself is one of the first a youngster is asked to spell when he enters upon a career as a gardener or seedsman, and when he has satisfied his questioner he has rarely satisfied the botanical authorities, because many of the best seed catalogues and some gardening dictionaries gave the title incorrectly as *Eschscholtzia*, though there is no warrant for the inclusion of the letter *t*. Authorities have given the generic title variously as *Eschholtzia*, *Eschholzia*, *Escholtzia* *Eschscholtzia*, and *Eschsholzia*, so there is some excuse for errors in orthography.

Another curious point is that Eschscholzias are almost as frequently described as perennials as annuals. From the horticultural point of view the popularly grown forms are annuals, but it would not be difficult to prove that in many places, especially in sandy places near the sea, plants may survive for two or more seasons. Only one species need be considered here, *i.e.* *Eschscholzia californica*. This is best sown in March or early in the autumn, in light soil and a sunny position; the seedlings being thinned out to 9 ins. apart.

Eschscholzia californica (Syns. *E. caespitosa, compacta, crocea, Douglasii, hypecoides, rosea, tenuifolia,* and *Chryseis aurea*) bears yellow, orange-centred flowers. Its leaves are slender and finely divided. By selection the colours of the flowers have been increased, and varieties of special distinction are listed under name, and of these the following are a good selection :—*alba* (cream white); *Diana* (pale yellow and rose); *Golden West* (golden-yellow and orange); *Frilled Pink* (pink and cream, crimped flowers); *Mandarin* (orange, scarlet, and gold); *Mikado* (orange crimson); *Orange Queen* (deep orange and yellow); *Rose Cardinal* (creamy rose); *Rosy Queen* (rose and pink); and *Ruby King* (deep ruby crimson). All these are handsome summer bedding plants, and fine for providing colour in the rock garden, but a warm sunny position is essential to secure the freedom of flowering and brilliance of colouring which make Eschscholzias so strikingly effective.—C. H. C.

UP-TO-DATE SELECTIONS.

Eschscholzia Chrome Yellow.—Yellow. *E. Fireflame.* — Orange-scarlet. *E. Red Chief.*—Red.

ESPALIER MODE OF FRUIT CULTURE.—Not so many years ago this system of growing fruit was very much more practised in all gardens, large or small, and in many older gardens there are now grand specimens of the perfect training that such trees received. For Apples and Pears it is such an excellent system that every effort should be made to encourage its popularity, since they can be planted by any path side, occupying little space, giving little trouble, but a pleasing appearance at all times, and producing good crops of the finest fruit if a few precautions are taken.

First, the soil should be well drained. Second, if the drainage and soil is not good, it should be made good before planting. Third, the position should be sunny and not shaded by trees. Fourth, the varieties need very careful selection; they should be of the best and, of course, suitable for the district. Fifth, the stocks on which they are grafted or budded are very important.

We must remember that the growth of espalier-trained trees is restricted, and that to plant trees on a rampant free-growing stock means trouble later on; the roots penetrate to a bad subsoil, and soon need root-pruning, or lifting. If they fruit, such fruit is cracked, spotted, and ruined in appearance; in fact, it is difficult to say what evils do not follow unsuitable stocks. For all trees of restricted growth the broad-leaved or English Paradise stock is the best for apples, as it gives a moderate sturdy growth; its roots do not ramble to great distances or great depths, but form a mass of fibres with a reasonable range of the stem. They can thus be fed heavily or otherwise with manure according to the crop the tree is bearing. The Crab or Free stock is first-rate for standard apple trees, but one of the worst for espalier trained ones. Another great advantage of trees worked on a stock with moderating influence on growth is, that the roots being practically close at home, can get the full benefit of solar influence, and are easily fed, and by this feeding the roots keep near the surface, and are altogether under more control than if on very robust stocks.

In many places Pears are highly esteemed, but they are not as satisfactory as they would be if they were grafted or worked on the Quince stock instead of the Pear; in fact the Quince and the Pear stocks have just as much influence on the Pear as the Broad-leaved and Crab stock have on the Apple, and the remarks are equally applicable to both.

The question of varieties is a most difficult one, as no hard and fast rules can be laid down. A variety that succeeds admirably in one village or district may be a total or partial failure in the next parish. Therefore it is advisable before going to the expense of buying and planting espaliers, to ascertain which varieties do best under restricted culture in one's own immediate neighbourhood. Almost any tree that is successfully grown as a bush, pyramid, or cordon tree, will answer very well as an espalier.

Taking half a dozen culinary Apples, the following will do well for the purpose named:—Lane's Prince Albert, September to March; Ecklinville Seedling, August to October; Newton Wonder, September to April; Rev. W. Wilks, October and November; Early Victoria, July and August; Edward VII., January to April.

Six varieties for dessert:—James Grieve, September to October; Allington Pippin, October to December; Beauty of Bath, August; Egremont Russet, October to December; King of the Pippins, September to January; King's Acre Pippin, November to March.

The finest dessert variety of all is ***Cox's Orange Pippin***, but it requires a warm soil and situation; under these conditions it possesses no equal, and should be first on the list to plant, otherwise it is somewhat uncertain. Those named are not fastidious, and may be relied upon in most places.

Taking a dozen varieties of Pears in their order of ripening, the following will all be found to succeed on espalier trees where this usually answers, as they possess good constitution, fertile habit, and excellent flavour:—Doyenne d'Été, July; Souvenir du Congrès, September; Louise Bonne of Jersey, October; Durondeau, October to November; Beurré Hardy, October to November; Beurré Superfin, November; Doyenne du Comice, November to December (the finest of all pears); Glou Morceau, December to January; Winter Nelis, December to January; Josephine de Malines, December to February; President Barabe, February to March; Easter Beurré, February to March. If a stewing variety is wanted Catillac is one of the most reliable.

Peaches, nectarines, plums, cherries, and apricots are not included amongst trees for espaliers, as this style of training is quite unsuited for them in the open.—S. T. W.

ESPALIERS: PRUNING OF. — See *PRUNING FRUIT TREES.*

ETRUSCAN HONEYSUCKLE (*Lonicera etrusca*).—See *CLIMBING AND TRAILING PLANTS.*

EUCALYPTUS (AUSTRALIAN GUM TREE. Nat. Ord. Myrtaceæ).—This plant is of vigorous growth, producing a fine effect the same season from seed. Sow in heat in February or March, in good turfy loam, peat, and silver sand. Temperature needed, 40–50° F.

Greenhouse Species.—*Eucalyptus citriodora.* — White. Flowers in September. Height, 1½–4 ft.

E. coccifera.—Purple. Flowers in November. Height, 1½–6 ft.

E. cordata.—White. Flowers in July. Height, 1½–6 ft.

E. ficifolia. — Crimson. Flowers in September. Height 1½–6 ft.

E. *globulus* (BLUE GUM).—White. Flowers in July. Height, 1½–6 ft.

See also *TREES.*

EUCHARIDIUM (Nat. Ord. Onagraceæ). — This genus consists of two or three species, all from California and all quite hardy. They have neat foliage and look well when grown in masses in the rock garden, or in beds, or as marginal subjects. An August sowing gives the best results, but March sown plants will provide flowers in late summer and autumn. Thin out to 4 ins. or 6 ins. apart.

What to Grow.—Below we describe the three best :—

E. Breweri. — Flowers sweetly scented and of pale rose colour. They are produced freely throughout the summer. Height, 6 ins.

E. concinnum.—The colour of this varies from blush to lilac-purple, and the plant blooms throughout the summer. Height, 8 ins.

E. grandiflorum is practically a large-flowered form of *E. concinnum*, but sometimes accorded specific rank.

EUCRYPHIA.—For the best species see *CLIMBING AND TRAILING PLANTS.*

EUDIANTHE.—Now included in the genus *LYCHNIS.*

EULOPHIA.—See *ORCHIDS.*

EULOPHIELLA.—See *ORCHIDS.*

EUNOMIA.—Now included in the genus *ÆTHIONEMA.*

EUONYMUS.—For the best species see *CLIMBING AND TRAILING PLANTS* and *SHRUBS.*

EUONYMUS MILDEW.—See *DISEASES OF PLANTS.*

EUPATORIUM (HEMP AGRIMONY. Nat. Ord. Compositæ).—This is a genus of useful evergreen shrubs and hardy herbaceous perennials of easy culture. The first section should be potted in peat, loam, and sand. It is propagated by cuttings in spring under frame or hand-light in little heat. Temperature required, 40–50° F.

Greenhouse Species.—*Eupatorium floribundum.* — Blue. Flowers in July. Height, 1–2 ft.

E. ianthinum.—Purple. Flowers in January. Height, 1–1½ ft.

E. odoratum.—Pink. Flowers in June. Height, 1–2 ft.

E. vernale.—White. Flowers in February. Height, 1–1½ ft.

E. weinmannianum. — White. Flowers in February. Height, 1–2 ft.

Perennial Border Species.—These are coarse, but useful subjects for the herbaceous border and shrub border. They are of very easy culture, quite hardy, and need no special comment save that ordinary good garden soil is required in a sunny site and that efficient staking is essential to success. Propagation is best effected by root division in the spring, which is also the most suitable planting period. We recommend the following :—

Eupatorium ageratoides (Syn. *E. altissimum*). — This bears white flowers in September and grows about 4 ft. in height.

E. ambiguum.—Syn. *E. serotinum*, below.

E. aromaticum (Syn. *E. cordatum*). —This is similar to *E. ageratoides*, but is aromatic and blooms in July.

E. cannabinum (HOLY-ROPE).—This bears pink flowers from June onwards and grows about 4 ft. high.

E. cordatum.—Syn. *E. aromaticum*, above.

E. perfoliatum (BONE-SET).—This is a white sort blooming from July onwards and growing 2–4 ft. high.

E. purpureum. — This and its variety *maculatum* bear pink and purple flowers respectively from July to August and grow 4–5 ft. in height.

E. serotinum (Syn. *E. ambiguum*).—This bears violet flowers in October on plants a yard in height.

EUPHORBIA (SPURGE. Nat. Ord. Euphorbiaceæ).—This is a large genus of stove shrubs, greenhouse shrubs, greenhouse perennials, hardy and stove annuals, hardy or half-hardy biennials, and hardy herbaceous perennials. To describe the culture of any of the species save those in the last section is beyond our scope. None of the species are very desirable plants, and some are very weedy. The following are, however, probably the best known species: *E. amygdaloides* (Syn. *E. sylvatica*), the WOOD SPURGE; *E. Esula*, TURBITH; *E. helioscopia*, the SUN SPURGE (see article on *WEEDS*); *E. Lathyrus*, the CAPER SPURGE, and source of the well-known CAPERS useful for flavouring purposes; *E. Peplus*, the PETTY SPURGE (see article on *WEEDS*); and *E. segetalis*, the CORN SPURGE.

Perennial Border Species.—These require the usual treatment bestowed on hardy herbaceous perennials and are of easy culture, thriving in ordinary soil in a sunny site. They may be propagated by seeds and root division in the usual way. The best species are: *E. Cyparissias*, the CYPRESS SPURGE (height, 12 ins.); *E. hyberna*, the IRISH SPURGE (height, 12 ins.); *E. palustris*, the MARSH SPURGE (height, 3–4 ft.); *E. Paralias*, the SEASIDE SPURGE (height, 12 ins.); and *E. portlandica*, the PORTLAND SPURGE (height, 9 ins.). These may be used in the perennial and rock borders, also in the shrub border and wild garden, while *E. palustris* is useful in the drier portions of the water garden.

EUPHRASIA.—See EYEBRIGHT in *MEDICINAL HERBS*.

EUPROCTIS.—See BROWN TAIL MOTH in *INSECT PESTS*.

EURHODODENDRON.

This is a group of Rhododendrons and is quite the largest. It includes most of the plants contained in our list of Rhododendron species. See article on *RHODODENDRON*.

EUROPEAN GOOSEBERRY MILDEW. See under GOOSEBERRY MILDEW, EUROPEAN, in *DISEASES OF PLANTS*.

EUROPEAN LARCH (*Larix europaea*). See *TREES*.

EURYANGIUM.—Now included in the genus *FERULA*.

EUSTACHYS.—Now included in the genus ORNITHOGALUM.

EUTOCA.—See *PHACELIA*.

EVENING PRIMROSE (*Œnothera*. Nat. Ord. Onagraceæ).—The genus includes about a hundred annual, biennial, and perennial herbs, with yellow, rose, or purple flowers. The two biennial Evening Primroses described below may be sown in the open border in June or July, and thinned or transplanted to bloom the following summer. If allowed to ripen seeds they sow themselves, and the seedlings may be transplanted to suitable places. The Perennial Border Species succeed with the usual treatment bestowed on perennials.

Annual Species.—See *GODETIA*.

Biennial Species.—These are somewhat numerous, but the two best are described below:—

Œnothera biennis.[1]—A pale yellow fragrant sort, blooming from June to September, and averaging about 2–4 ft. in height. *Œ. lamarckiana* is frequently named *Œ. biennis* var. *grandiflora*.

Œ. lamarckiana.—Also pale yellow and fragrant. The flowers are large, and are produced from June to September. The height averages 2–5 ft.

Perennial Border Species.—There is a large number of these. We have only space for a few of the best, and those named below are all quite hardy:—

Œnothera anisoloba.—A white sort, changing to red, flowering in June, and averaging about half a yard in height.

Œ. Fraseri.—A yellow sort similar

---

[1] This is the COMMON EVENING PRIMROSE.—EDITOR.

to *Œ. glauca*, of which it is by some considered a variety.

Œ. fruticosa.—Probably the most popular of the perennial kinds. This sort bears yellow flowers from June to August, and averages 1–3 ft. in height.

Œ. glauca.—This also is yellow, and blooms from June to August. Its height is 1½–2 ft.

Œ. macrocarpa.—This sort is often offered by nurserymen. It is synonymous with *Œ. missouriensis*. See ROCK GARDEN SPECIES below.

Œ. Nuttallii.—A white sort blooming in June and July. Height about 1 ft.

Œ. Sellowii.—A yellow July blooming sort about 2 ft. high.

Œ. serotina.—A yellow late-flowering sort coming in during September, averaging half a yard high.

Œ. speciosa.—This, described below, is suitable for the perennial border.

Œ. Youngii.—A yellow sort flowering from June to September, and averaging half a yard or more in height. Probably a form of *Œ. fruticosa.*

Rock Garden Species. — Four species are suitable for the rock garden. They thrive in sunny, well-drained situations, and are propagated by seeds sown in gentle heat in March.

Œnothera acaulis (Syn. *Œ. taraxacifolia*).—This produces Dandelion-like leaves in tufts. Flowers white, fading to pink, very large. Site sunny. Soil sandy loam. Flowering Period, June to September. Height, 6 ins.

Œ. caespitosa (Syns. *Œ. marginata* and *Œ. eximia*).—A spreading species sending up tufts of hoary leaves. Flowers white, 4–6 ins. across, and sweetly scented. Site sunny. Soil sandy loam. Flowering Period, May to June. Height, 9 ins.

Œ. missouriensis (Syn. *Œ. macrocarpa*).—Tufts of silky leaves and prostrate stems are produced by this plant. Flowers yellow. Site sunny. Soil sandy loam. Flowering Period, June to September. Height, 6 ins. or more.

Œ. speciosa.—A sub-shrubby species with slender wiry stems. Flowers pure white to rose, and sweetly scented. Site sunny. Soil sandy loam. Flowering Period, June to September. Height, 2 ft.

See also *GODETIA*.

EVERGREEN CANDYTUFT (*Iberis sempervirens*).—See *CANDYTUFT*.

EVERGREEN HEDGES.—See *GARDEN HEDGES*.

EVERGREEN OAK (*Quercus Ilex*).—See *TREES*.

EVERGREEN ORPINE (*Sedum Anacampseros*).—See *SEDUM*.

EVERGREEN ROSES (*Rosa sempervirens*) —See *ROSES FOR ALL PURPOSES*.

EVERGREEN VIRGINIA CREEPER (*Vitis striata*).—See *CLIMBING AND TRAILING PLANTS*

EVERGREENS.

The term evergreen applies to all subjects which retain their leaves or foliage in a green state from one year's end to another. It not only applies to shrubs, to which the term is most often applied, but also to numerous trees, many rock plants, and some few hardy perennials. Evergreens are quite indispensable in gardens of all sizes, and even the smallest villa residence is proud to possess a few of them. When shrubs are not evergreens they are said to be *Deciduous*—that is, they lose one year's leaves at the fall instead of retaining them until after the new leaves have opened. The shrubs described in our article *FLOWERING SHRUBS* belong to both classes, and all should be grown where space permits. Under *SHRUBS* and *TREES* we give extensive lists of these subjects and distinguish those which are evergreen by the letter *E*. As a rule evergreens are of easy culture, thriving with but little care. The general hints in our article *SHRUBBERIES: MANAGEMENT OF*, should be useful to the reader in this connection, and hints on the pruning of these subjects will be found in our article *PRUNING ROSES AND SHRUBS*.

See also *FLOWERING SHRUBS*, *SHRUBS*, and *TREES*.

EVERLASTING FLOWERS.

None of the flowers that we grow are in the true sense of the word "everlasting," and when this descriptive word is used horticulturally it is generally in a comparative sense. Several genera (mostly belonging to the natural order Compositæ) produce flowers of a tough papery consistency, which if gathered and hung downwards in a dry, clean place before they are fully expanded will dry well, and retain their form and colour for a long time if placed in dry vases, after their stems have been hardened by the drying process.

All the classes of plants referred to in the following notes are best treated as half-hardy annuals. They should thus be sown in the usual way in gentle heat during February or March, after which pricking out and hardening off follow prior to planting out of doors.

Acroclinium roseum.—See *Helipterum roseum*, below.

Ammobium (EVERLASTING SUNFLOWER).—*A. alatum*, the WINGED EVERLASTING, and its variety *grandiflorum* bear yellow and white flowers from June to August, on plants 1–2 ft. high. The latter is the larger and finer variety. *A. plantagineum* bears white flowers about the same time, but rarely exceeds 18 ins. in height.

Athanasia annua.—See *Lonas inodora*, below.

Gnaphalium obtusifolium.—This is a yellow July flowering plant about 12 ins. high.

Helichrysum (EVERLASTING FLOWER).—*H. bracteatum* is the principal species and is an attractive subject blooming from July to September, and growing 1–3 ft. high. There are numerous varieties offered by seedsmen, and the flowers may be white, rose-pink, red, clear yellow, or golden-yellow. The sorts named *monstrosum* and *nanum* are probably the best on the market.

Helipterum.—This Australian genus is sometimes known by the name of IMMORTELLE, but this popular name belongs more to *Xeranthemum*, to be described directly. *H. humboldtianum* (Syn. *H. Sandfordii*) bears yellow flowers from June onwards and averages 1½ ft. in height. *H. Manglesii* (Syn. *Rhodanthe Manglesii*), is a charming plant for pot culture in the conservatory or for house decoration. It bears rose-coloured flowers from June onwards, and grows 1 ft. high. It may be sown out of doors in April, in a sunny site, and the seedlings thinned to 2–3 ins. apart each way. *H. roseum* (Syn. *Acroclinium roseum*), a pretty subject, bears rose-coloured flowers from June onwards, and averages 1–2 ft. in height.

Lonas inodora (Syn. *Athanasia annua*) bears yellow flowers from July onwards, and averages 1 ft. in height. A distance of not less than 6 ins. should be left between each plant.

Rhodanthe Manglesii (Syn. *R. maculatum*).—See *Helipterum Manglesii*, above.

Waitzia aurea.—This bears golden yellow flowers in the late summer, and averages 18 ins. in height.

Xeranthemum (IMMORTELLE).—This is a very popular everlasting flower, especially abroad, where, when dyed and dried, it is used for wreath-making. If the flowers are cut when just opening and hung downwards in a dry shed for a time they will last for a long period and may be used for room decoration. The best species are: *X. annuum* (purple); *X. cylindraceum* (white); *X. erectum* (white); *X. inapertum* (purple); and *X. longepapposum* (white); all of which bloom from July onwards, and average 9–12 ins. in height.

C. H. C.

See also *HELICHRYSUM.*

EVERLASTING PEA (*Lathyrus latifolius*).—See *CLIMBING AND TRAILING PLANTS.*

EVERLASTING SUNFLOWER.—See AMMOBIUM in *EVERLASTING FLOWERS.*

EXACUM.—See *ANNUALS, HALF-HARDY: LIST OF.*

EXARRHENA.—Now included in the genus MYOSOTIS.

EXETER ELM (*Ulmus montana fastigiata*).—See *TREES.*

EXHIBITING FLOWERS.

The amateur floriculturist who grows flowers for exhibition would be distinctly displeased with the Editor and the staff of BLACK'S GARDENING DICTIONARY if an article, although short, was not included on the matter of exhibiting flowers, and although we are unable to give the lengthy dissertation upon this subject that some readers would wish, we are quite willing to spare a little space for a few practical hints on this all-important interesting topic.

As a judge who has officially attended many shows, the present writer wishes first of all to draw the attention of exhibitors to the frequent irresponsible mistakes which they make. For instance, the schedule provides that four Dahlias of one variety shall be exhibited, and the exhibitor and would-be prize-winner finds that he has five uniform blooms, so instead of devoting his vases or glasses to the four best he puts five flowers in, and thus has to be immediately disqualified. Similar mistakes are found in bouquets of flowers. In a recent show attended by the writer the schedule specified that twelve different species of flowers were to form one bouquet. Competitors in this class failed to grasp the meaning of the term twelve different species. Some put fourteen, some as many as twenty, and some put only eight different flowers. The Secretary was approached on this matter to see whether any inquiries as to the exact meaning of the term Twelve Species had been made, but competitors, instead of asking, had concluded that their own reading of the term was correct.

The first thing that judges do in the show tent is to read the rules which govern the show. Now, long experience enables most judges to grasp in a very few minutes the salient points of these regulations, and one of the first things they do is to weed out any exhibits which are too poor to consider and which are irregular in character. The first needs no comment, but the irregularities in exhibits which are so common need a word or two of attention. A man, for instance, enters a class for twelve blooms of one variety of any flower, for instance the Dahlia. He finds he has twelve of uniform and moderate size, which are of good shape and of unblemished character. Then just as he is going to the show he sees that he has three much bigger blooms uncut. Temptation immediately assails him, and he falls a victim. He removes three of the uniform good-sized blooms and puts in the three much larger ones, thinking that he will be certain to win the prize this way. The judges arrive. They see this one-sided, ungainly exhibit, and they weed it out. The man who has twelve blooms of uniform size is awarded the prize.

A frequent source of annoyance to judges and disappointment to exhibitors is the fact that those who show do not label their exhibits correctly. Exhibitors do not seem able to grasp the simple instructions in the schedules; their exhibits often get hopelessly mixed up with other classes, and frequently when one man is exhibiting in three or four different sections or classes he will put three or four varieties of flowers together when only one is allowable. Much waste of the judges' time could be avoided if every exhibitor would read his rules first, and would assure himself that his exhibit was correctly staged. Unless the schedule distinctly specifies to the contrary, it is assumed that one exhibit must contain only one variety of any one florists' flower classed as such.

General Hints.—In conclusion we will give a few general hints to exhibitors of flowers.

(*a*) Cut your best flowers so long as they are of uniform size.

(*b*) Never put in a blemished flower among unblemished ones. If you have not a perfect bloom of any given size, substitute a perfect specimen of as near that size as possible, rather than put in one that is fading or gone to seed.

(*c*) Water all flowers intended for exhibition the night before, and be certain to give them a good soaking.

(*d*) Apply no stimulants to flowers required for exhibition on the night before the exhibition, since, unless great care is exercised, they may be spoiled at the last moment.

(*e*) Cut your flowers in the early morning while the dew is still on them, where possible. Take them immediately into the cellar, or put them in water in any similar cool place.

(*f*) Cut your flowers with as long stems as possible, since you can easily shorten them if necessary in the show tent.

(*g*) Take a few extra blooms to the show tent with you in case some may be damaged or be found defective when arranging the exhibits.

(*h*) Pack your flowers for transit with great care in damp moss, keeping the ends of the stems to one end with extra moisture, or they may suffer if they have to travel far on a hot day.

(*i*) Use a little phosphate of ammonia, say a quarter of an ounce to the gallon of water, a day or two before the show if your flowers are not sufficiently open for the purpose of exhibition.

(*j*) Use a little gum arabic dissolved in water for fixing the petals of such flowers as Pelargoniums should they open too soon, unless your schedule specifies to the contrary.

(*k*) Lastly, arrive at the show tent by the time specified in the schedule, and complete your exhibit as early as possible. Amateurs are unaware of the time it takes up to set three or four exhibits, but judges know to their cost how excessively aggravating it is to be unable to start their work by the advertised time. The result is that they have to hurry it, on account of exhibitors being still in the tent, and not leaving time to do the work properly.—E.

EXHIBITING FRUIT.

It is unnecessary to give details of this work here as fruit is but seldom exhibited by beginners, and fruit shows are usually few and far between. The general rules described in our article on *EXHIBITION VEGETABLES* hold good for fruit also, and chapters concerning this work are given for the benefit of those who wish to specialise in this direction, in the larger works on fruit growing.

EXHIBITING SWEET PEAS.—See *SWEET PEAS.*

EXHIBITION, ROSES FOR.—See under ROSES FOR EXHIBITION in *ROSES FOR ALL PURPOSES.*

EXHIBITION VEGETABLES.

The growing, raising, and exhibiting of vegetables is an art in which success is attained, not by any collection of carefully preserved secrets, but rather by diligence, care, tenacity, forethought, and, in a lesser degree, by the results of experience. All those who grow for home consumption should set the exhibition standard before themselves as the model to work from, and when they reach a perfection with which they feel confident successful exhibiting could be done, if so inclined, then is the time for making the first attempt at what always proves a fascinating task. Before doing this they will discover that the vegetables grown up to the standard aimed at are far more profitable than the rough and ready grown specimens.

Having raised the exhibition article, do not hesitate to show it, even though success is unlikely at the first attempt or two; for it is at this juncture that much of the experience previously referred to will be gained, and for the persevering exhibitor success will be born of preliminary failure. The writer well remembers his first attempt at a large exhibition. After a number of local successes, the inspiration came to attempt something bigger, and the necessary steps were taken. Came the day of the show, and the young enthusiast, allowing what he considered ample time for staging, arrived at the venue of the show, only to find that the older and wiser men had already set up their exhibits. The result was a rush to get the exhibit up, and the final accomplishment was to find oneself classed only fifth in the order of merit. Gain number one had, however, accrued, and the following year, allowing far more time for setting up, the writer discovered himself, after the judging, amongst the first three; and, still profiting by what he learned, had the proud position the following year of finding himself classed number one in the company of the leading growers and exhibitors in the country. Thus one learns by experience, and the first precept I would set for the intending exhibitor is to learn all he can from the old hands of the game.

This is not all, however, for to be a successful exhibitor one has many things to study carefully in the cultivation of vegetables. One must know the soil, what it is capable of producing, what treatment it requires, and what addition it is necessary to add in the form of manure, etc. etc., and this can only be known from the result of keen and steady observation.

Next, one must seek exact knowledge of the varieties to be grown, in the direction of time required to obtain vegetables at the point of highest perfection; for one variety of a kind will arrive at maturity far quicker than another, and this is a point especially required to be known when one is aiming at growing for exhibition on a certain date. Where more than one show is to be visited, then another matter to consider and master is a succession of supplies; and furthermore, the feeding and watering of the crops require much study and attention. Perfection is the point aimed at, and this is where the qualities of diligence, care, etc., are required in the application of study, and though it may appear at first sight a formidable task, yet all these matters lighten as one gains more and more experience, until it becomes almost a second nature to know exactly what has to be done.

The standard of excellence which should be aimed at in an exhibit comprises several parts. One must spare no effort to attain excellence of quality combined with fineness of shape, freeness from blemish, and, lastly, size. Of the latter attribute much could be said, but here it will suffice to warn would-be exhibitors against procuring largeness of their specimens at the expense of the quality thereof.

Ideals to Aim at in some of the principal vegetables are given below:

BEETROOT.—The best varieties only should be exhibited, and it matters not, in our opinion, whether they are of a very dark colour or a deep blood-red. The roots should be of medium size, perfect in shape, and without any blemish.

BRUSSELS SPROUTS.—Aim at small, perfectly firm buttons of a dark green colour and as nearly alike as possible.

CABBAGE.—Medium size, conical in shape, firm heads, and free from marks of caterpillars, etc.

CARROTS.—Let these be medium-sized, free from blemish, no green at the crowns, symmetrical in shape, and of a deep red colour.

CAULIFLOWERS.—These should be perfectly fresh, of medium size, the curds not cracked, and as white as possible.

CELERY.—This should be quite solid, with no trace of prematurely running to flower, perfectly blanched, and not marked by being eaten by slugs, etc.

CUCUMBERS.—A brace of these should be as nearly alike as possible, quite young, of medium size, perfectly straight, not rubbed, and the two old blooms should be retained on the ends of the fruit.

LEEKS.—These should be of large size, long length of blanch (from 16–18 ins.), no trace of bulbing at the bottom, and perfectly clean.

ONIONS.—These should be well ripened, of perfect shape, quite solid, and as large as possible.

PARSNIPS.—Perfect shape should be aimed at, of medium size, and without blemish of any kind.

PEAS.—Large pods perfectly filled, not too old, and the pods should show no signs of having been rubbed.

RUNNER AND FRENCH BEANS.—Providing these are young and the pods will snap easily without any strings, these can hardly be too long, but the point to aim at is to have the pods as nearly alike as possible as regards size.

TOMATOES.—One of the most important dishes. These should be as nearly alike as possible, of good colour, perfect in shape, quite ripe but solid, and of medium and uniform size.

TURNIPS.—Medium size, quite young and free from blemish, with small tap roots.

No varieties of vegetables should be exhibited which are not considered to be of first-rate table quality, as all good judges should take this into serious consideration.

General Hints.—Before packing one's exhibit for transport to the site of the show, it is very essential to have carefully read all the clauses of the schedule relating to the class in which it is to be shown, as well as all the general rules affecting it. Of these a careful mental note should be made, and every precaution taken that the exhibit does not break any of these rules, otherwise the result may mean a disqualified exhibit.

When preparing the items, each specimen should be handled as a precious object, and all prepared as far as ever possible beforehand. All root vegetables should be very carefully sponged clean in clear cold water, and those carrying rootlets should have these carefully removed with a sharp knife, leaving the main tap root straight and unbroken. The crowns of such vegetables as Beetroot, Carrots, Parsnips, Turnips, etc., should be carefully trimmed back, and any damaged or decayed leaves removed. Cucumbers, Peas, Tomatoes, or any vegetables bearing bloom should be most gently and carefully handled, so that they do not get marked and the bloom disturbed.

The packing should, where possible, be done by the exhibitor, or at any rate under his careful supervision, so that there is no risk of damage during transit, or of anything being left out. Trays and stands should be gone over to make sure they are all in good order and ready for use at the show, and it is advisable to draw up a list of all that is to be taken to the show for exhibition in the way of the exhibit, so that one can work to it and know everything is *au fait*. Another point of importance is either to travel with the exhibit oneself, or send it in the charge of a really reliable person in whom one has full confidence, in order to guard against any of it going astray *en route*. In arranging or a collection of vegetables, one or two extra dishes should always be taken, as it frequently happens one's opponent may have a very superior dish of some particular kind or variety which it is intended to stage, whereas by substituting some other dish it may equalise or even reap higher points, as I have known many a case where there has only been a margin of half a point between the competitors.

A good supply of fresh green parsley should always be available when staging for setting up dishes of vegetables, and when putting up make the dishes look as artistic as possible. Very pleasing effects can result, especially in large collections, where care is taken in contrasting and distributing colours, and where equal merit rests between two competitors' exhibits, then the artistic and careful arrangement must finally count.—ED. B.

EXHIBITION VIOLAS.—See *VIOLA*.

EXHIBITORS' GUM.

Exhibitors often require a gum for "fixing" the petals of the flowers they show and while various kinds of so-called FLORAL GUM are on the market, the material is easily made at home and is then very inexpensive. To do so get a pound of pure gum arabic from a chemist or drysalter, and slowly dissolve this in a gallon of water, or rather less if a strong gum is required. Store in well-corked bottles and apply with a small camel-hair brush.

EXOCHORDA.— For the best species see *SHRUBS*.

EXOGONIUM.— Now included in the genus *IPOMOEA*.

EXPERIMENTS.— See *GARDEN EXPERIMENTS*.

EYEBRIGHT. — See *MEDICINAL HERBS*.

F

FABA.—Now included in the genus *VICIA*.

FABIANA.—For the best species see *SHRUBS*.

FACCHINIA.—Now included in the genus *ARENARIA*.

FAGOPYRUM (Nat. Ord. Polygonaceæ).—This is a genus of hardy annual plants easily grown in ordinary soil if sown in March or April. *F. cymosum* is known as BEECH WHEAT; *F. esculentum* is the well-known BUCKWHEAT used abroad as a vegetable, and in this country for feeding stock. This must not be confused with the BUCK BEAN or BOG BEAN mentioned in our articles on *MENYANTHES* and *MEDICINAL HERBS*. The above two species bear pink flowers from July to August, and grow 2–3 ft. high.

FAIR MAIDS OF FRANCE (*Ranunculus aconitifolius*).—See *RANUNCULUS: PERENNIAL BORDER SPECIES*.

FAIRIES' WAND.—A name applied to the genus *GALAX*, which see.

FAIRY RINGS.—See *DISEASES OF PLANTS* and *WEEDS*.

FAIRY ROSE (*Rosa indica minima*).—See *ROSE SPECIES*.

FALSE ACACIA (*Robinia Pseudacacia*). See *TREES*.

FALSE ASPHODEL (*Tofieldia*. Nat. Ord. Liliaceæ).—This must be carefully distinguished from the true plant of this name which we describe in our article on *ASPHODEL*, as it belongs to quite a distinct genus though to the same natural order (*Liliaceæ*). Our present plant is one of very easy culture provided a light loamy or, better still, peaty soil and a moist site are afforded it. Like the true Asphodel it is a hardy herbaceous perennial useful for the border, and may also be planted in the wild garden or in the rock garden. It may be propagated by root division in the usual way in the spring, which is also the best planting period.

What to Grow.—We recommend the following:—

Tofieldia alpina.—Syn. *T. calyculata*, which see.

T. borealis.—Syn. *T. palustris*, which see.

T. calyculata (Syn. *T. alpina*).—This is a white sort blooming in July, and growing 6 ins. high.

T. glutinosa is similar to *T. calyculata* in all its characters.

T. palustris (Syn. *T. borealis*).—This is the well-known SCOTCH ASPHODEL bearing white flowers in May or June, and growing 6 ins. high.

FALSE AZALEA.—See *AZALEASTRUM*.

FALSE BROME-GRASS.—See *BRACHYPODIUM*.

FALSE CATERPILLARS.—See under CURRANT AND GOOSEBERRY SAWFLIES in *INSECT PESTS*.

FALSE DAISY.—See *BELLIUM*.

FALSE DICTAMNUS, or FALSE DITTANY (*Ballota Pseudo-dictamnus*). See *BALLOTA* and *MARRUBIUM*.

FALSE DRAGON'S HEAD (*Physostegia virginiana*. Nat. Ord. Labiatæ).—This must be distinguished from the true DRAGON'S HEAD—a name applied to the members of the genus *Dracocephalum* (see *DRAGON'S HEAD*)—which it resembles in some respects, as well as belonging to the same natural order, although botanically quite distinct. It is a useful hardy border plant, thriving in light, sandy soil, rich in rotted vegetable matter, but free from acid peat. It may be treated as a half-hardy annual by being raised in heat and planted out, when it will bloom rather late in the same year. Root division in March, at which time it may be most successfully planted, or cuttings inserted in a frame in the summer are better means of increasing the stock. The plant itself bears attractive red flowers from July to August, and its variety *speciosa* is a delightful pink, while *alba* is a good white. The height of both averages 1½–3½ ft.

NEW VARIETY.

Physostegia verbenoides.—This has long leathery leaves, and bears small cream-white flowers in large trusses.

FALSE HELLEBORE.—See *VERATRUM*.

FALSE INDIGO (*Amorpha fruticosa*). See *SHRUBS*.

FALSE LOOSESTRIFE.—See *LUDWIGIA*.

FALSE MALLOW.—See *MALVASTRUM*.

FALSE MILDEWS.—See *MILDEWS*.

FALSE SOLOMON'S SEAL (*Smilacina*. Nat. Ord. Liliaceæ).—This must be carefully distinguished from *SOLOMON'S SEAL*, on which we devote a separate article. Some of the less important species are now included under *Clintonia*—a genus we do not describe in the present work. The plant is somewhat less poisonous than Solomon's Seal, and may be used for cutting.

Culture.—This is quite an easy matter. All the species described below will thrive in ordinary light sandy garden soil to which some leaf-mould has been added, if a sunny or very lightly shaded site is provided, and can be used for semi-wild gardening. Propagation is best effected by division of the roots in the spring, while the best months for planting are February and March. There are one or two greenhouse species which are excluded as being of little importance.

What to Grow.—We recommend the following :—

Smilacina oleracea.—This bears white flowers slightly tinted with rose-pink. It blooms in May and June, while its height averages about 1 yd.

S. racemosa (FALSE SPIKENARD).—This is a useful sort bearing light lemon-yellow flowers in May and June. It grows 6–12 ins. high.

S. stellata (STAR-FLOWERED LILY OF THE VALLEY).—This is probably the prettiest species of all. It bears starry-white flowers from May to June, and grows 6–9 ins. high.

FALSE SPIKENARD (*Smilacina racemosa*).—See *FALSE SOLOMON'S SEAL*.

FALSE STARWORT.—See *BOLTONIA*.

FARFUGIUM.—Now included in the genus *SENECIO*.

FARKLE-BERRY (*Vaccinium arboreum*).—See *SHRUBS*.

FARMYARD MANURE.

Strictly speaking, farmyard manure should be a mixture of horse, cow, pig, sheep, and poultry manure. If it is this, then it is well worth the usual price asked for it (10s. per load); but should it largely consist of cow manure, it will be very heavy, but little going to the ton, and in this case 6s. per load is as much as should be paid for it, to include carting a mile. Its price is rising.

The gardener who can get as many tons of the best farmyard manure as he wishes, is indeed one of the lucky men of this world. He will be able to grow all the fine crops that he wishes, with very little need for the aid of artificial fertilisers. Most of us, however, are not able to get enough of it, even though we place our orders a long time in advance of when we require the manure. So we have to supplement farmyard manure with artificials.

Well-made farmyard manure is an almost perfect humic material. But it is doubtful whether, out of any hundred cases chosen, the gardener receives the manure in anything like a perfect condition. More often than not when it arrives it is almost "red hot," due to over-quick fermentation, and in this condition it loses much of its value. Our opinion is that not more than 1 per cent. of the farmers of to-day know how to make farmyard manure properly. If they did, the crops produced by applying it to farm and garden land would be appreciably greater.

It is not our task in this Dictionary to give advice to farmers on making manure, but what we can do is to tell gardeners how to tackle it when it arrives in this highly undesirable condition.

Undoubtedly the first thing to do is to cool it. The manure should be shot up in the compost and manure yard, and should at once be spread out to allow as large a surface to be exposed as possible. The next thing to do is to drench it with cold water, or far, far better, to drench it with salt water, using 3 lb. of salt to every 30 gallons of water. After half an hour or so, the manure should have cooled very considerably; if it has not, more salt water should be thrown on to it. After this period it should be made into a solid, rectangular stack, the top portion of which should slope down to either side at an angle of 45°. The manure as it is built up should be beaten or trodden as firm as it can possibly be made, and a hole left at the top in which a thermometer can be placed. Should the temperature run up, some of the drainings of the drenching you gave your manure should be shot into the hole. If the temperature continues to rise, and you cannot bear the heat when you thrust your hand into the hole, then the stack must be taken to pieces again, the manure being shaken out anew, and further salt water applied. The heap is then re-made very, very firmly; loose stacking is responsible for more waste of farmyard manure than almost anything else.

The uses of farmyard manure are very numerous. It can be used for making into hotbeds (see article on *HOTBEDS*); it can also be stacked for a year, when it becomes a beautifully mild, rich material for adding to potting soils for strong-growing subjects. It can be mixed with equal parts of rotted vegetable refuse for the trenching of land (see article on *SOIL CULTIVATION*) and for making into mushroom beds. For digging into the surface soil of borders, or for surface-rooting crops, or indeed for the making of pea, bean, and celery trenches, it should be in a half-rotted condition, which condition is produced by allowing it to be stacked for a month or a trifle longer before use. For further information about manures, their management and use, the reader should refer to the following articles: *MANURES*, and *MANURING: PRINCIPLES OF*.—E. T. E.

FASCIATION.—See *DISEASES OF PLANTS*.

FAT HEN.—A weed. For MEANS OF CONTROL see *WEEDS*. See also *CHENOPODIUM*.

FATSIA.—For the best species see *SHRUBS*.

FEATHER GRASS (*Stipa pennata*).—See *ORNAMENTAL GRASSES* and *STIPA*.

FEATHER (or FEATHERED) HYACINTH (*Muscari comosum monstrosum*).—See *GRAPE HYACINTH*.

FEATHERS AS MANURE.—See "Waste Hair" in our notes on ORGANIC PRODUCTS under NITROGENOUS MANURES in *MANURES*.

FECA.—Now included in the genus TRICHOMANES, for which see *FERNS AND FERN GARDENING*.

FEDIA.—Now included in the genus *VALERIANELLA*, which see.

FEEDING PLANTS.

What is our object in feeding our plants? Very briefly we may say this important work is undertaken to secure a crop that is economically profitable, and every gardener recognises that all plants, whether fruits or vegetables, ornamental trees or shrubs, or foliage and flowering plants, are greatly benefited by the application of proper fertilisers or plant foods. No matter how perfect is the general cultivation, that crop will not give the best return if the soil is lacking in an essential element of plant food; and it should be the object of every gardener to see that the soil is sufficiently provided with at least three substances, namely, nitrogen, phosphates, and potash. A fourth substance, lime, is also necessary, but it is not applied directly as a plant food, but more because of its physical effect upon the soil.

What Crops Need.—Each element of plant food has a particular work to perform, and is applied for a particular purpose. For instance:—

Beans require phosphates and potash for seed production;

Cabbages need nitrogen for leaf production;

Celery needs nitrogen and phosphates for stem and leaf production;

Potatoes need nitrogen and potash for leaf and tuber production;

Turnips require potash and phosphates for root formation, and for the manufacture of sugar and starch; and so on.

When to Apply.—In applying plant foods it is most important to give the dressings at the right time. It is useless to apply a plant food at a time when the crop can obtain no material benefit from the application. For example, it would be waste of money and labour to apply basic slag to a quick-growing crop in the growing season, because the phosphates in basic slag are not readily available, and the crop would be harvested before the basic slag had been able to give to the plant any soluble phosphates. It will be easily understood that those plant foods which are not readily available must be applied when the ground is not occupied with the crops; the plant can then obtain full benefit from the dressing. Quick-acting manures, such as nitrate of soda, sulphate of ammonia, etc., must be applied when the crop is growing, for, if applied in winter or early spring, the soluble food would be washed away by the rains before the plants could derive any benefit from their use.

The slow-acting phosphatic plant foods, such as basic slag and bone-meal, should be applied in the autumn or early winter, during trenching or digging operations. This enables the phosphates to be rendered soluble by the time the plant is ready to absorb this element. Superphosphate, another plant food supplying phosphate, is more active than basic slag, and is applied in spring when the ground is forked over after digging or trenching and prepared for seed sowing and planting.

Potassic manures, such as muriate of potash and kainit, are fairly active, and should be applied in late spring. Sulphate of potash is readily soluble, and may be applied to a growing crop with benefit.

How to Apply.—Plant foods may be applied in two forms, namely, solid and liquid. The insoluble plant foods are applied in the solid form, and the soluble plant foods may be either applied in the solid or liquid state. When applied in the liquid form they are even more quick-acting, as they have not to be dissolved by the soil water before they act. Applying manures in the liquid state is termed *Liquid*

Manuring, and it is a convenient method of giving soluble manures in the case of small plots or greenhouses when the plants are growing. Nitrate of soda, sulphate of potash, sulphate of ammonia, and superphosphate may be readily applied by making weak solutions of these substances, and a dilute solution of farmyard manure will also be found an excellent stimulant for growing crops. In applying liquid manures the solutions should be very weak, and the applications should be given about once a week. It is most important that the liquid should not come in contact with the stem or foliage, and if the soil is dry it should be well watered before applying the liquid manures, otherwise they will sink below the reach of the plants and much will be lost, as well as burning the roots maybe.

Food for all Crops.—The following dressings will be found best suited for the varous crops, the quantities in each case being for *one square rod* (30¼ sq. yds.) unless otherwise stated :—

BEANS.—See under PEAS, below.

CABBAGE TRIBE.—Apply 3 lb. of superphosphate of lime[1] broadcast before planting, and when established, sprinkle a teaspoonful of sulphate of ammonia at the base of each plant.

CELERY.—Apply 3 lb. of superphosphate of lime in the trenches before planting, and as a top-dressing, 1 lb. of sulphate of ammonia when the plants are established.

FRUIT TREES.—Apply 3 lb. of bonemeal in the winter. In the spring apply 1 lb. of sulphate of ammonia and 1 lb. of superphosphate of lime.

LETTUCE.—See under SALADINGS, below.

PEAS AND BEANS.—Apply 3 lb. of superphosphate of lime, scattering it along each thirty-yard run or row before sowing, and if the plants appear to need a stimulant, apply ½ lb. of sulphate of ammonia to the same area, when they are about 3 ins. high.

POTATOES.—Apply 4 lb. of superphosphate of lime in the rows of drills when planting, and 1½ lb. of sulphate of ammonia just before earthing up. Dress the ground in the winter with 4 lb. of kainit, or 8 lb. of wood ashes.

ROOT CROPS.—Apply 4 lb. of superphosphate of lime, a fortnight before sowing, and as a top-dressing use 1 lb. of sulphate of ammonia or 1¼ lb. of nitrate of soda.

SALADINGS.—Sprinkle 2 oz. of superphosphate of lime per sq. yd. on the ground before planting out, and ½ oz. of sulphate of ammonia when the plants are established.

TOMATOES (*Indoor*).—To each bushel of soil add 8 oz. of the following mixture :—

Sulphate of ammonia, 1 oz.
Sulphate of potash, 3 oz.
Superphosphate of lime, 6 oz.

After the first truss of fruit is formed, the plants will benefit by being watered every fortnight with 4 oz. of the above mixture per 5 gals. of water. The first ingredient may be omitted if the soil is very rich.

TOMATOES (*Outdoor*).—Apply 3 oz. of the above mixture per sq. yd. when planting out.

VEGETABLE MARROWS.—Animal manure in liquid form may be applied from the time the first six fruits have set. Fertiliser may be used, and 1 oz. of superphosphate of lime per 2 gals. of water once a week is useful.—J. K. R.

---

[1] Where superphosphate of lime is recommended, basic slag is preferable if the soil is heavy. Apply 4–5 lb. per sq. rod, as early in the winter as possible.—EDITOR.

FEEDING VEGETABLES.—See *FEEDING PLANTS*, and under GENERAL MANAGEMENT in *VEGETABLES: GENERAL CONSIDERATIONS*.

FELTED BEECH COCCUS.—See *INSECT PESTS*.

FENCES.—See *GARDEN FENCES*.

FENDLERA.—For the best species see *SHRUBS*.

FENNEL.—See *MEDICINAL HERBS*.

FENNEL FLOWER.—A popular name for NIGELLA. See *LOVE-IN-A-MIST*.

FENUGREEK.—See *TRIGONELLA*.

FENZLIA.—Now included in the genus *GILIA*, which see.

FERMENTS.—See *GERMINATION OF SEEDS*.

FERN HOUSES.—See *FERNS AND FERN GARDENING*.

FERN-LEAF EELWORM.—See under EELWORMS in *INSECT PESTS*.

FERN-LEAVED OAK (*Quercus pedunculata filicifolia*).—See *TREES*.

FERN (MALE).—See *MEDICINAL HERBS*.

FERNS DISLIKING LIME.—See *LIME HATERS*.

FERNS AND FERN GARDENING: GREENHOUSE AND HALF-HARDY FERNS.—Ferns will always be more or less extensively cultivated for their delicate beauty, finely cut fronds, the restfulness of their greenery, their utility for home decorations in a variety of ways, for mixing with cut flowers, the interest attaching to them in many ways, and lastly as a hobby, when the cultivator may develop into a specialist and cultivate them to the exclusion of most or every other kind of plant.

Fern Houses.—Some attention must be given to the situation of the fern house by those who would grow these subjects successfully. They dislike too much or too intense sunshine, and though the house may be shaded it will save labour in this respect if the structure faces the east or north. The builder or owner may fix upon such a site for the sake of convenience, and the latter attempt the cultivation of flowering plants in the house with partial or complete failure, but find that Ferns grow admirably in it. The house may even face the south if it is shaded from the east and west by wings of the dwelling, because the short period of exposure to direct sunlight has no injurious effect. Greenhouse Ferns may be grown in an unheated house or even in a cold frame during the summer, but it should be furnished with a heating apparatus in order that the fire may be lighted during frosty nights or frosty periods, in the winter, so that the temperature may be kept from falling much below 40–45° F., during the night or early morning. In any case frost should be excluded.

No attempt should be made by amateurs to grow stove Ferns, which require a night temperature of 55–60° F., under the above conditions, otherwise the results will generally be unsatisfactory. Half-hardy Ferns may be grown to perfection in such a house, if attention is given to their special requirements. All Ferns require a certain amount of atmospheric moisture, more especially in summer when making their growth. Half-hardy sorts, such as *Adiantum Capillus-Veneris*, the Killarney, *Todea superba*, and other filmy Ferns, will be happy if frost is more or less excluded and they are covered with a bell-glass or special case to preserve moisture about them. The Walking Fern (*Scolopendrium rhizophyllum*), as well as *Aspidium falcatum* and its varieties, will live outside in mild and maritime districts, but should be sheltered by evergreen boughs during the colder and more windy periods of the winter.

Potting Ferns.—Indoor sorts

should be rested by keeping them cooler and drier overhead and at the roots during the autumn and winter, from October onwards. When they begin making fresh growth about March that is the time to repot them, before the young fronds are long enough to get broken in the operation. The old ball of soil may be considerably reduced to enable the plants to be put in the same size of pot, or a slightly larger one according to the quantity of roots. Young plants, making rapid growth, may be repotted into larger sizes several times a year, without reducing the ball. Press the soil fairly firmly about the roots of old plants, but considerably less about quickly growing young ones.

Most Ferns may be grown in a compost consisting of two-thirds fibrous loam, the other third being made up of good leaf-mould, well-decayed manure, and coarse sand. This is specially suitable for Maidenhair Ferns. Most other kinds will also grow well when one-third of peat is used instead of the leaf-mould and manure. Leaf-mould should be sifted to take out the rubbish, and the manure should be dry enough to be rubbed through a half-inch sieve. The loam and peat should be broken up and lumpy, but should never be sifted.

Propagating Ferns.—Ferns may be increased at the time of potting by dividing those that make more than one crown, such as Davallias, Maidenhairs, Pteris, and others. Hartstongues, Nephrodiums, and others occasionally produce small offsets at the side of the crowns, and these may be removed and potted. Some of the Aspleniums and other genera produce small plants on the fronds: these may be dibbled into pans of compost, or whole fronds may be pegged down till the young plants are rooted. Spores are the most rapid means of propagation for a large proportion of the Ferns. Keep a close eye upon the fronds, and when the spore cases begin to turn brown remove a frond or portions of it, and wrap them up in white paper, putting them in a closed box for a few days, when an abundance of spores for sowing will be available. Fill some pots with good loam, to within an inch of the top, using no drainage, and surface this with some finely broken and dusty crocks or bricks. Give a thorough watering, and when this has soaked away sow the spores as thinly as possible. Stand each pot in a saucer of water, cover it with a piece of glass, and place it in a case or under a bell-glass where light is available, but where there is no direct sunshine. When the pots get covered with small green scales (*prothallia*), transplant some of the small tufts with a pointed peg into other pots filled with compost and surfaced with sandy soil. Saucers of water beneath the pots should be used to supply moisture.

Ventilating Fern Houses.—Free ventilation must be given on all favourable occasions during growth to keep down the temperature of the house, and enable the plants to make sturdy and firm growth. Usually it will be sufficient to open the top ventilators except during the hottest periods, but even then the side ventilators should not be used to excess or the air of the house may be rendered too arid for the welfare of the plants.

Watering Ferns.—Newly potted Ferns should be watered through a fine rose to settle the soil, and no more water given till actually required. As the plants begin to grow freely, they will require to be watered more and more frequently, till when in full growth, during the heat of summer, they may require watering every day, though it should not be given unless they are actually dry. There should be no stagnant water about the roots, so that provision should be made for clear drainage at the time of potting. It will not be necessary to syringe the plants overhead, if the air is kept moist by damping down all paths and open spaces once or oftener a day. Hard or chalky water is liable to spot or disfigure the fronds, and rain water is in every way preferable. Less water will be required in winter, but the soil should never be allowed to get dust dry, whether the plants are evergreen or deciduous.

Hardy Ferns. — Shade and moisture are two of the principal requisites in the successful culture of hardy Ferns outdoors. The nature of the soil does not very much matter, provided it can be kept sufficiently moist during the summer months. Aids to this effect are secured by selecting the situation, by using soil of a moisture-retaining nature, by employing a liberal quantity of peat or leaf-mould, or both, before planting, and by giving annual top-dressings of either in spring, after the old fronds have been cut away and the Ferns are about to commence fresh growth. The fading fronds should not be cut away in the autumn, because they afford a natural protection to the crowns. The effect of a hardy fernery is greatly heightened if it is built up in the form of a rockery, with more or less bold elevations and rocky, projecting angles, according to size, as in the case of rockeries for alpine flowering plants. A stream, either natural or artificial, furnishes variety, and its banks may be clothed with the stronger-growing sorts, such as Lady Ferns, Ostrich Feather, The Royal Fern, and others that delight in ample supplies of water. Care should be taken in planting the smaller Ferns, that they do not get overhung and smothered by their taller neighbours. Shrubs of fair height, or trees, may be planted on purpose to furnish shade, but care should be taken to prevent the roots from encroaching on the Fern ground.

Hardy Ferns, mostly British, may be grown entirely in the greenhouse in pots or planted out on rockeries. The house may be unheated or merely heated to exclude frost. By this latter means the evergreen species remain bright and fresh throughout the winter. The soil must be kept moist in the winter whether the plants are deciduous or evergreen, and copious supplies of water will be needed in the summer. British Ferns are as handsome as exotics and more extensively diversified in form. They are propagated in the same ways as the greenhouse and half-hardy sorts above dealt with.

What to Grow.—In the selections given below, *G.F.* signifies that it is a greenhouse Fern; *H.F.* denotes that it is hardy; and *H.H.F.* means that it is half-hardy. Only the very best species and varieties are referred to on account of keeping the list within reasonable limits.

Adiantum Capillus-Veneris (*G.F.* or *H.H.F.*).—The Common Maidenhair or Maidenhair Fern, and its varieties *crispulum*, *magnificum*, and *undulatum*. Height, 1 ft.

A. cuneatum (*G.F.*),and its varieties *gracillimum*, *grandiceps*, *grandis*, and *Lawsoni*. Height, 1 ft.

A. excisum (*G.F.*), and its variety *multifidum*. Height, 6–12 ins.

A. formosum (*G.F.*). Height, 1–2 ft.

A. hispidul (*G.F.*), and its variety *tenellum*. Height, 1 ft.

A. Moorei (*G.F.*). Height, 1½ ft.

A. pedatum (*H.F.*). Height, 1–2 ft.

A. tenerum (*G.F.*), and its variety *Victoriæ*. Height, 6–12 ins.

A. Wagneri (*G.F.*). Height, 1 ft.

Anemia Phyllitidis (*G.F.*). Height, 1 ft.

Aspidium acrostichoides (*H.F.*). Height, 1–2 ft.

A. aculeatum (*H.F.*).—The PRICKLY SHIELD FERN, and its varieties *cruciatum*, *pulcherrimum*, and *pulcherrimum gracillimum Drueryi*. Height, 2–3 ft.

A. angulare (*H.F.*).—The SOFT PRICKLY SHIELD FERN, and its varieties *cristatum*, *cruciatum*, *divisilobum cristatum*, *divisilobum densum*, *plumosum*, and *proliferum densum*. Height, 2–3 ft.

A. aristatum (*G.F.*), and its variety *variegatum*. Height, 1 ft.

A. capense (*G.F.*). Height, 2–4 ft.

A. falcatum (*G.F.* or *H.H.F.*), and its varieties *caryotideum*, *Fortunei*, and *Rochfordii*. Height, 12–18 ins.

A. Lonchitis (*H.F.*).—The HOLLY FERN. Height, 6–12 ins.

A. munitum (*H.F.*). Height, 1–2 ft.

Asplenium Adiantum-nigrum (*H.F.*).—The BLACK MAIDENHAIR SPLEENWORT. Height, 1 ft.

A. bulbiferum (*G.F.*), and its varieties *fabianum*, *laxum*, and *minus*. Height, 2–3 ft.

A. flaccidum (*G.F.*), with drooping fronds. Length, 1–2 ft.

A. fontanum (*H.F.*).—The SMOOTH ROCK SPLEENWORT. Height, 3–6 ins.

A. marinum (*G.F.* or *H.H.F.*).—The SEA SPLEENWORT, and its varieties *imbricatum* and *ramosum*. Height, 6–12 ins.

A. obtusatum lucidum (*G.F.*). Height, 2–2½ ft.

A. septentrionale (*H.F.*).—The FORKED SPLEENWORT. Height, 3 ins.

A. Trichomanes (*H.F.*).—The BLACK-STEMMED SPLEENWORT, and its varieties *cristatum*, *Moulei*, and *multifidum*. Height, 3–12 ins.

A. viride (*H.F.*).—The GREEN SPLEENWORT. Height, 3–4 ins.

Athyrium Filix-fœmina (*H.F.*).—The LADY FERN, and its varieties *cruciatum*, *Fieldiæ cristatum*, *Frizelliæ*, *plumosum*, *plumosum superbum Drueryi*, *pulcherrimum*, and *Victoriæ*. Height, 2–4 ft.

Blechnum brasiliense (*G.F.* or *H.H.F.*).—The TREE BLECHNUM, and its variety *corcovadense*. Height, 2–3 ft.

B. occidentale (*G.F.*). Height, 12–18 ins.

Camptosorus. See *Scolopendrium rhizophyllum*.

Cryptogramme crispa (*H.F.*).—The MOUNTAIN PARSLEY. Height, 12 ins.

Cyrtomium. See *Aspidium falcatum*.

Cystopteris alpina (*H.F.*).—The ALPINE BLADDER FERN. Height, 6–12 ins.

C. bulbifera (*H.F.*). Height, 12–18 ins.

C. fragilis (*H.F.*).—The BRITTLE BLADDER FERN, and its varieties *cristata*, *dickieana*, and *sempervirens*. Height, 6–12 ins.

C. montana (*H.F.*).—The MOUNTAIN BLADDER FERN. Height, 6–9 ins.

Davallia bullata (*G.F.*), and its varieties *Mariesii* and *Mariesii cristata*. Height, 6–12 ins.

D. canariensis (*G.F.*).—The HARE'S FOOT FERN. Height, 12–15 ins.

D. elegans (*G.F.*), and its varieties *elata* and *polydactyla*. Height, 1 ft.

D. hirta (*G.F.*), and its variety *cristata*. Height, 2–4 ft.

D. tenuifolia (*G.F.*), and its varieties *Burkei*, *stricta*, and *Veitchii*. Height, 12–18 ins.

Doodia aspera (*G.F.*), and its varieties *gigantea* and *multifida*. Height, 6–12 ins.

D. caudata (*G.F.*). Height, 6 ins.

Doryopteris. See *Pteris palmata.*

Gymnogramme calomelanos (*G.F.*).—The SILVER FERN, and its varieties *chrysophylla* and *Martensii*, both known as the GOLD FERN. Height, 1 ft.

G. pulchella (*G.F.*).—The SILVER FERN. Height, 1 ft.

Hymenophyllum tunbridgense[1] (*G.F.* or *H.H.F.*).—The TUNBRIDGE FILMY FERN, and its variety *Wilsoni.* Height, 3 ins.

Lastrea. See *Nephrodium.*

Lomaria alpina (*H.F.*).—The ALPINE HARD FERN. Height, 6–9 ins.

L. ciliata (*G.F.*), and its varieties *grandis* and *major.* Height, 1 ft.

L. gibba (*G.F.*), and its variety *tincta.* Height, 1–2 ft.

L. Spicant (*H.F.*).—The HARD FERN, and its varieties *concinnum*, *cristatum*, *imbricata*, *plumosum*, and *ramo-cristatum.* Height, 1 ft.

Lygodium japonicum (*G.F.*).—The CLIMBING FERN, or SNAKE'S TONGUE FERN. Height, 5–6 ft.

Nephrodium æmulum (*H.F.*).—The HAY-SCENTED BUCKLER FERN. Height, 1–2 ft.

N. decompositum (*G.F.*), and its varieties *glabellum* and *Shepherdi.* Height, 1 ft.

N. erythrosorum (*G.F.* or *H.H.F.*). Height, 1–2 ft.

N. Filix-mas (*H.F.*)—The MALE FERN, and its varieties *cristatum*, *polydactylum*, *pseudo-mas*, *pseudo-mas cristatum* (the KING OF MALE FERNS), and *pseudo-mas cruciatum.* Height, 2–4 ft.

N. goldieanum (*H.F.*). Height, 2–3 ft.

N. molle (*G.F.*), and its variety *corymbiferum.* Height, 18 ins.

N. montanum (*H.F.*).—The MOUNTAIN BUCKLER FERN, and its variety *cristatum.* Height, 1–2 ft.

N. patens (*G.F.*). Height, 1–2 ft.

N. remotum (*H.F.*).—The REMOTE BUCKLER FERN. Height, 12–15 ins.

N. rigidum (*H.F.*).—The RIGID BUCKLER FERN. Height, 12–15 ins.

N. spinulosum (*H.F.*).—The PRICKLY-TOOTHED BUCKLER FERN, and its variety *dilatatum* (the BROAD BUCKLER FERN). Height, 1–3 ft.

N. Thelypteris (*H.F.*).—The MARSH BUCKLER FERN, or MARSH SHIELD FERN. Height, 1–2 ft.

Nephrolepis exaltata (*G.F.*), and its varieties *elegantissima*, *Marshalli compacta*, and *todeoides.* Height, 1–4 ft.

Onoclea germanica (*H.F.*).—The OSTRICH FERN. Height, 2–3 ft.

O. sensibilis (*H.F.*).—The SENSITIVE FERN. Height, 1 ft.

Onychium japonicum (*G.F.*). Height, 1 ft.

Osmunda cinnamomea (*H.F.*). Height, 2 ft.

O. Claytoniana (*H.F.*). Height, 2 ft.

O. palustris (*G.F.* or *H.H.F.*), and its variety *congesta.* Height, 2–3 ft.

O. regalis (*H.F.*).—The ROYAL FERN, and its variety *cristata.* Height, 2–6 ft.

Pellæa cordata (*G.F.*). Height, 1 ft.

P. falcata (*G.F.*). Height, 1 ft.

P. rotundifolia (*G.F.*). Height, 1 ft.

Platycerium alcicorne (*G.F.*).—The ELK'S HORN FERN, and its varieties *cordreyi* and *Hillii.* Height, 12–15 ins.

Polypodium appendiculatum (*G.F.*). Height, 6 ins.

P. aureum (*G.F.*), and its varieties *cristatum* and *glaucum.* Height, 1–2 ft.

P. Dryopteris (*H.F.*).—The OAK FERN, and its variety *Robertianum* (the LIMESTONE POLYPODY). Height, 1 ft.

P. Lingua (*G.F.*), and its variety *corymbiferum.* Height, 1 ft.

---

[1] Grow these under a bell-glass.

P. Phegopteris (*H.F.*). — The BEECH FERN. Height, 12–18 ins.

P. vulgare (*H.F.*).—The COMMON POLYPODY, and its varieties *cambricum* (the WELSH POLYPODY); *cornubiense* (CORNISH POLYPODY); *semilacerum* (IRISH POLYPODY); and *trichomanoides*. Height, 9–12 ins.

Polystichum. See *Aspidium*.

Pteris cretica (*G.F.*), and its varieties *albolineata*, *crispata*, *major*, *nobilis*, and *Wimsetti*. Height, 1–2 ft.

P. palmata (*G.F.*). Height, 9–12 ins.

P. serrulata (*G.F.*).—The RIBBON FERN, and its varieties *chiswickense*, *cristata*, *gloriosa*, and *gracilis*. Height, 1–2 ft.

P. tremula (*G.F.*).—The AUSTRALIAN BRACKEN, and its varieties *flaccida* and *Smithiana*. Height, 1–2 ft.

P. umbrosa (*G.F.*). Height, 1 ft.

Scolopendrium rhizophyllum (*G.F.* or *H.H.F.*).—The WALKING FERN. Height, 4 ins.

S. vulgare (*H.F.*).—The HARTSTONGUE FERN, and its varieties *corymbiferum*, *crispum*, *crispum grande*, *crispum maximum*, *Kelwayi*, *ramo-cristatum*, and *spirale*. Height, 1 ft.

Todea barbara (*G.F.*). Height, 1½ ft.

T. superba[1] (*G.F.* or *H.H.F.*). Height, 1–2 ft.

Trichomanes radicans[1] (*G.F.* or *H.H.F.*).—The KILLARNEY FERN. Height, 9–18 ins.

Woodsia alpina (*G.F.* or *H.H.F.*). —The ALPINE WOODSIA. Height, 2–3 ins.

W. ilvensis (*G.F.* or *H.H.F.*).—The OBLONG WOODSIA. Height, 3–4 ins.

Woodwardia radicans (*G.F.*).—Height, 2–3 ft.—J. F.

NEW VARIETIES.

The following are among the best and most noteworthy :—

Adiantum gloriosum Lemkesii.—A greenhouse fern, the young fronds of which are tinted light red, but change to pale green.

A. grossum.—A handsome fern from tropical America, with large, leathery pinnules.

Polypodium Dryopteris plumosum Christopherson.—A fine fern with much-divided highly-cut deep green leaves, which are often 2–3 ins. across.

FERNS FOR NORTH BORDERS.—See HARDY FERNS in *NORTH BORDERS*.

FERROCYANIDE OF POTASH.—See POTASSIUM FERROCYANIDE in *POTASH AND POTASSIUM COMPOUNDS*.

FERROUS SULPHATE.—See *IRON AND IRON COMPOUNDS*.

FERTILISATION OF PEACHES.—See *PEACHES*.

FERTILISER TOP-DRESSINGS.—See *TOP-DRESSING*.

FERTILISERS.—See *ARTIFICIAL FERTILISERS* and *FEEDING PLANTS*.

FERTILISERS, MANURES, AND SOILS: WEIGHTS OF BUSHELS OF.—See *WEIGHTS AND MEASURES*.

FERTILISERS: QUICK-ACTING.

The following list contains the more important manures or fertilisers which act quickly, details of the use of which will be found usually in the article on the metal in question, thus *Chloride of Soda* will be found under SODIUM CHLORIDE in our article on *SODA AND SODIUM COMPOUNDS*.

Chile Saltpetre (or *Nitrate of Soda*).
Chloride of Ammonia.
Chloride of Soda.
Dissolved Bones.
Dissolved Guano.
Dried Blood.
Epsom Salts (or *Sulphate of Magnesia*).
Guano.
Glauber's Salts (or *Sulphate of Soda*).
Green Vitriol (or *Sulphate of Iron*)

---

[1] Suitable only for growing in a Fern case.

Nitrate of Ammonia.
Nitrate of Lime.
Nitrate of Potash.
Nitrate of Soda.
Phosphate of Ammonia.
Phosphate of Potash.
Phosphate of Soda.
Pigeon Dung.
Poultry Manure.
Sal-ammoniac (or *Chloride of Ammonia*).
Salt (or *Chloride of Soda*).
Saltpetre (or *Nitrate of Potash*).
Sulphate of Ammonia.
Sulphate of Iron.
Sulphate of Potash.
Sulphate of Soda.
Superphosphate of Lime.

FERTILISERS : SLOW-ACTING.

The following list contains the most important fertilisers or manures which are somewhat slow in action. Details will be found in other articles, usually on the metal in question, as to how to use them, *i.e.* *Chloride of Potash* will be found under POTASSIUM CHLORIDE in our article on *POTASH AND POTASSIUM COMPOUNDS*.

Basic Slag.
Basic Superphosphate.
Bone Dust.
Bonemeal.
Carbide Refuse.[1]
Carbonate of Ammonia.
Carbonate of Lime.
Carbonate of Magnesia.[1]
Carbonate of Potash.
Carbonate of Soda.[1]
Chalk (or *Carbonate of Lime*).
Chloride of Magnesia.
Chloride of Potash.
Cyanamide.
Ground Bones.
Gypsum (or *Sulphate of Lime*).
Hoof Parings.
Horn Dust.
Ivory Dust.
Kainit.
Muriate of Potash (or *Chloride of Potash*).
Nitre Cake.
Nitrolim (or *Cyanamide*).
Phosphate of Lime.
Reverted Superphosphate.
Slaked Lime.
Sulphate of Lime.
Sulphate of Magnesia.
Wood Ashes.

FERULA (GIANT FENNEL. Nat. Ord. Umbelliferæ).—This is a genus of coarse-growing hardy herbaceous perennials of very easy culture and suitable for the wild garden. It must not be confused with the genus *FOENICULUM* (which see), containing the COMMON FENNEL described under FENNEL in our article on *MEDICINAL HERBS*. The chief species, which bear yellow flowers from June to August, and grow 1–4 ft. in height, are *F. Assafoetida* (or *F. foetida* of some authorities), the source of that noxious drug Assafetida; *F. galbaniflua*, the GALBANUM PLANT; *F. glauca*, useful in very large borders; *F. Narthex* (Syn. *F. Polaki*), objectionably known as DEVIL'S DUNG; and *F. Sumbul*, the comparatively well-known plant SUMBUL. For the very many other species larger works must be consulted.

FERULAGO.—Now included in the genus *FERULA*, which see.

FESCUE GRASS.—See *FESTUCA*.

FESTUCA (FESCUE GRASS. Nat. Ord. Gramineæ).—This is a large genus of grasses, including ornamental, pasture, and lawn species. *F. varia* is probably the best of the first, and grows 3–4 ins. high. The HARD FESCUE (*F. duriuscula*) and SHEEP'S FESCUE (*F. ovina*) are among the best of the second, while *F. ovina* and *F. rubra* are good on lawns (see article on *LAWNS AND THEIR MANAGEMENT*). Other notable species include *F. elatior*, the DOVER GRASS, and its variety *pratensis*, the well-known MEADOW FESCUE; *F. montana altissima*, known as ARAB'S DISS; and *F. Myuros*, the well-known MOUSE-TAIL GRASS.

---

[1] These are not very slow, but owing to their caustic or concentrated properties they should be used with caution.—EDITOR.

FEVERFEW.—See *MEDICINAL HERBS.*

FICARIA.—Now included in the genus *RANUNCULUS.*

FIDDLE DOCK (*Rumex pulcher*).—See *RUMEX.*

FIELD MADDER (*Sherardia arvensis.* Nat. Ord. Rubiaceæ).—This is a weedy plant of no commercial or horticultural importance. MADDER (True) is referred to under *RUBIA,* which see.

FIELD MARIGOLD (*Calendula arvensis*).—See *MARIGOLD.*

FIELD PEA (*Pisum arvense*).—See *PISUM.*

FIELD POPPY (*Papaver Rhoeas*).—See *POPPIES : ANNUAL SPECIES.*

FIELD SLUG.—See under SLUGS AND SNAILS in *INSECT PESTS.*

FIG (*Ficus Carica.* Nat. Ord. Urticaceæ).—The fig will accommodate itself to almost any kind of structure and mode of training. A good lean-to house answers best for early forcing, while span-roofed pits are best adapted for pot-culture. Figs continue to produce fruits for a long time after the first flush of fruits are gathered. They are gross feeders and strong growers, and therefore require a circumscribed space for their roots. They may be trained on wires as provided for vines and peaches. Prepare the border with concrete and drainage as recommended for peaches, and allow a square foot of border to every square yard of trellis.

Compost.—A medium loam tending to be sandy is the most suitable, but if a heavier loam is used, this must be corrected by the addition of lime rubble, broken bricks, burnt earth, and road scrapings. Always place a turf, grass side downwards, over the drainage, chop up the turf roughly, add the above correctives, and mix thoroughly.

Avoid manures, as young fig trees generally grow too fast the first few years. Make up the border, using fresh turf for a retaining wall. Plant in early spring, carefully disentangling the roots, and spread them out carefully. Make thoroughly firm, and cover the roots with about 3 ins. of compost.

Forcing.—Where early forced figs are required, pot-trees are almost indispensable, as they are easily managed and most productive. Moderate growers and free fruiting varieties are the most suitable, such as *Brown Turkey, St John, Violette Sepor,* and *White Marseilles.* If the trees can be plunged into a moderate bottom heat of say 70–75° F., so much the better. Commence with a temperature of 50° F. at night, with a rise of 10° during bright days, increasing the temperature gradually up to 63° F. at night, with the usual rise during the day. Although the green fruits are liable to drop, they must be finally thinned to about three on each shoot. Pinch out the points of the shoots, when fertilisation is complete, to five or six leaves, increasing the temperature and moisture accordingly. Ventilation must be regulated according to the outside atmosphere. Liberally feed the plants with diluted liquid manure when carrying heavy crops, and never allow the trees to suffer for want of water. Give more air, with a slightly drier atmosphere, and discontinue syringing when the fruits begin to ripen. Permanent planted trees should be treated in a similar manner. Many grow their trees on the extension system of training, and never stop the shoots, with equally satisfactory results when grown in a confined border. Liberal feeding, thin training, and plenty of moisture are their chief requirements. After the crop is gathered, cleanse the trees of any insects, taking care to do any stopping or pinching of the shoots in time for another growth to mature before the leaves fall.

Varieties.—*Bourjasotte Grise.*—Medium size, black, rich, and excellent.

Brown Turkey.—See next article.

Negro Largo.—Black, hardy, and prolific, one of the best.

Osborn Prolific.—White flesh, medium size, and good.

Pingo de Mel.—Medium size, yellow flesh, rich, and good.

White Marseilles. — See next article.—F. J.

FIG : Outdoor Culture.

In the southern and western counties the fig flourishes as a standard or big bush. There are at Worthing fig trees of timber size.

It is a great mistake to plant figs in a rich soil; they delight in plenty of porous stones, brick bats, etc., in the soil, and then make stout, short-jointed wood, which fruits freely. The figlets, carried through the winter, develop in spring, and an autumn crop is also to be looked for. On walls the main stems should be kept widely apart, so that the breast wood from these can extend outwards, where it generally fruits freely. If very dry in July and August, a liberal watering will swell the fruits. From time to time take out here and there some old wood boughs and lay in younger shoots. In winter regulate the boughs, and in summer cut out any sappy long shoots to let in sun and air.

Varieties.—There are only a few suitable for outside culture, the best four of which are given below :—

Angelique.—Skin green, flesh jelly like. Very delicate and sweet.

Brown Turkey.—Blackish-green. A very free bearer. Fruit delicious in flavour; the most reliable.

Brunswick.—Very large, greenish-purple. A strong, vigorous grower, though it crops sparsely; fine flavour.

White Marseilles.—Like *Angelique* this fruits freely and ripens early.—G. B.

FIG MARIGOLD.—A popular name applied to the genus *MESEMBRYANTHEMUM*, which see.

FIGWORT (*Scrophularia.* Nat. Ord. Scrophulariaceæ). — The genus Scrophularia is a small and not very important one, containing mostly hardy herbaceous perennial plants of easy culture. These thrive in ordinary light loam in a sunny or lightly shaded site, and may be propagated by seeds sown in the usual way in the summer, or by division of the roots in the autumn or spring, which latter period is the best time for planting.

What to Grow.—Only a few species can be described here, and for others reference to larger works must be made :—

Scrophularia aquatica variegata (WATER BETONY).—This may be used in the wild or water garden on account of the leafage. The flowers (produced in July) are an unattractive brown purple, and the plants grow about 1 yd. in height.

S. chrysantha.—This bears golden-yellow flowers from April to June, and grows about 2 ft. high.

S. nodosa (GREAT PILEWORT).—This bears scarlet flowers in July, and grows about 2 ft. high.

S. vernalis.—This is a yellow May flowering biennial species growing about 2 ft. high.

FIGWORT.—A name applied also to the genus *LINDENBERGIA*, which see.

FILBERT (*Corylus Avellana*).—See under COBNUT in *NUT CULTURE*.

FILIPENDULA.—Now included in the genus *SPIRAEA*, which see

FINGER AND TOE DISEASE.—See under CLUBROOT in *DISEASES OF PLANTS*.

FIR.—A name applied to the genus ABIES. See *TREES*.

FIR CONES.

Gardeners often wonder what to do with the fir cones which are dropped from trees annually, and sometimes they mix them with heaps of leaves in the hope they will rot down. The best way is to save them up and use them for fuel in the house throughout the winter. During the burning a delightful pine odour is given off, and as we sniff it in our easy chairs our thoughts soon fly back to the glories of the summer garden.

FIRE BUSH.—The genus EMBOTHRIUM and *E. coccineum*. See *CLIMBING AND TRAILING PLANTS* and *SHRUBS*.

FIRE FUNGUS.—See under DISEASES in *TULIPS*.

FIRE PINK (*Silene virginica*).— See *SILENE*.

FIRE THORN (*Crataegus Pyracantha*). See *CLIMBING AND TRAILING PLANTS* and *TREES*.

FISH AS MANURE.

Rotten fish is about one of the foulest smelling materials there is; but it is also one of the best manures where a phosphatic and humic manure is required. Thus full advantage should be taken of supplies by gardeners on the coast, and the production of the land will be enormously increased. We give below a few brief particulars of the various forms of fish available and the modes of using them as manures :—

Bad Fish.—In large fishing towns after a very big catch it often happens that it is impossible in warm weather to dispose of all the supplies before some of the fish gets what is popularly known as "touched." In bald language the heat quickly makes it go bad unless it is stored on ice. A supply of this bad fish is often available in large towns, for if a barrel is opened and the fish is not all that it ought to be, that barrel is condemned as unfit for human food, which means that it is as a rule sent off to a destructor to be burnt. Gardeners should secure a supply of this, preferably in the early autumn or winter, and either dig it in in a raw state, or mix it with soil in the manner described in a succeeding paragraph. It is very useful for most vegetables, fruit trees, and the more gross feeding hardy perennials.

Fish Bones.—A large supply of these is usually available at most fishing towns, and some can usually be obtained very cheaply at the fish markets in the larger inland towns where much fish is consumed. The bones make a very rich phosphatic manure if dissolved in sulphuric acid in the same way as ordinary bones, and this material can be used for most crops at the rate of 1 oz. per sq. yd.

Fish Guano.—This material is dealt with in our article on *GUANO*, to which reference should be made for a description of its uses and mode of application.

Fish Heads and Tails.—These are often available in fair quantities at large fish markets both on the coast and inland. To use them they should be well chopped up with a sharp spade and preferably mixed with half their own bulk of hot fermenting stable dung. The heap should then be covered with soil and allowed to mellow down for a couple of months, after which the material can be dug in at the rate of a good forkful per square yard for vegetables, and rather less for flowers. Another way of preparing them is to mix them with about a quarter of their own bulk of wood ashes, making the material into a heap with a hole at the top. On to this, human urine is poured until the mass is thoroughly saturated; then the heap is covered with several inches of soil and a slate put over the hole. In about a week's time the process of soaking the mass with urine is repeated, and the weekly soakings are continued until the whole has rotted down into a more or less soft mass of very rich, strong smelling humus. This material is invaluable for light soils, and a big barrowful per rod will be by no means too much to apply, in the late winter or spring. Fish heads and tails when buried in the soil without previous treatment take a considerable time to dissolve and thus are not so valuable.

Fish Meal.—This is obtained by drying any available fish offal from the markets, and usually the oil is got rid of by superheated steam. The resulting matter is ground to a fine powder and sold under this name. It is a phosphatic manure of no small value suitable for many crops, especially such as Globe Beet, Kohl Rabi, Celeriac, Swedes, Turnips, etc., and is suitable for most soils except those which are very heavy. It is best applied in the winter or early spring at the rate of 2–3 lb. per sq. rod and forked in. It is of no use as a liquid manure, but may be applied as a top-dressing and watered in.

Herring Refuse.—This is very abundant on the east coast at the herring season. It consists of a great variety of materials. There is sure to be a certain amount of bad fish in it, and with this is mixed up the sweepings from the harbour or dock where the herring pickers work. It can be dug into the land in its raw state or mixed with an equal volume of fresh manure, but in any case should be put on in the winter and not applied at a greater rate than about 3–4 cwt. per sq. rod.

Mussels.—These prove a valuable manure if properly treated. A quantity should be got together and either put through a poultry shell-crusher or put on a hard stone floor and crushed with a heavy lawn beater. The soft wet material which will result should be spread thinly on the ground in the early winter and dug in at once. It is useful for the grosser feeding crops as well as those fond of salt. It should be mentioned that the beds of young mussels give softer matter which may be dug in without this treatment. Mussels should not be allowed to rot away in a heap unless well covered with soil, as the stench they emit will be quite unbearable.

Oyster Shells.—Notes on the use of these will be found under SHELLS below.

Refuse from Canneries.—Where much fish is canned or cured refuse of value as manure will be abundant. It will contain not only an abundance of fish heads, tails, fins, etc., but also in many cases the outer skins, the spine and other bones, as well as the entrails. These last are the most valuable part, and while the stench of such decomposing matter will be quite impossible, if some can be had in a fresh state and be buried after being well mixed with an equal quantity of soil or manure, a highly valuable manure will result, suitable for use after about twelve months. This material can be used on most ground at the rate of 3–4 cwt. per sq. rod.

Shells.—These, after removal of the contained fish, are abundant in many districts at the coast, but their horticultural value is limited. Oyster shells or others of larger size are sometimes used for putting over the drainage holes in pots instead of crocks, and if the shells are ground to a fine powder they may be used on land in the same way as chalk. In districts where stone is scarce they can be mixed in as an ingredient for concrete for pathways, etc. They can, of course, be dissolved in nitric acid in the same way as limestone or chalk to yield nitrate of lime, but as the process is somewhat laborious it is better to buy the prepared article.

Shrimp Refuse.—Where much shrimping is done and the resulting fish sold for the ever popular "Shrimp Teas," it is necessary for it to be sorted and cleaned first of all. The resulting material soon decomposes if not disposed of, emitting a painful, searching odour, and it is the custom in such districts for the council or cleansing department to collect it at least every seven days and burn it in their destructors. This is very wasteful, and it is a much better plan for fish sellers who have gardens to mix this material with one-eighth part of naphthalened soil and to bury it in their gardens for about six or eight months. The mass can then be dug out and spread on the vegetable garden at the rate of 1–2 cwt. per sq. rod, digging it in without delay.—E.

FISH BONES.—See *FISH AS MANURE.*

FISH GUANO.—See *GUANO.*

FISH HEADS AND TAILS.—See *FISH AS MANURE.*

FISH MEAL.—See *FISH AS MANURE.*

FISH AND MEAT MEALS.—See under PHOSPHO-NITROGENOUS MANURES in *MANURES.*

FISH NETTING.—See *GARDEN NETTING.*

FISHBONE THISTLE (*Cnicus Casabonae*).—See *CNICUS.*

FITZROYA.—For the best species see *TREES.*

FIVE-LEAFLETED AKEBIA (*Akebia quinata*). — See *CLIMBING AND TRAILING PLANTS.*

FIXTURES OF TENANTS: LAW AS TO. See *GARDENING LAW.*

FIXTURES, SALE OF, BY TENANTS.—See *GARDENING LAW.*

FLAGS (*Irises*).—See *IRISES*, and *WATER GARDEN: PLANTS FOR THE.*

FLAGSTONES: ARTIFICIAL.—See *ARTIFICIAL FLAGSTONES.*

FLAME CLEMATIS (*Clematis Flammula*).—See *CLIMBING AND TRAILING PLANTS.*

FLAME FLOWER (*Tropaeolum speciosum*).—See *CLIMBING AND TRAILING PLANTS.*

FLAME NASTURTIUM (*Tropaeolum speciosum*).—See *CLIMBING AND TRAILING PLANTS.*

FLAT BODY MOTHS.—See *INSECT PESTS.*

FLAX.—See *MEDICINAL HERBS.*

FLAX LILY.—See *PHORMIUM.*

FLEA-BANE (*Pulicaria dysenterica*).—See *PULICARIA.*

FLEA BEETLE.—See under TURNIP FLEA BEETLES in *INSECT PESTS.*

FLEABANE.—See articles on *ERIGERON*, *INULA*, and *MEDICINAL HERBS.* The name is applied more especially to *Erigeron canadensis* and *E. speciosus.*

FLIES.

Flies include many kinds of insects. For instance, there are the sawflies, the houseflies, bluebottles, and the offal flies common on heaps of manure. It is about the last which we wish to say a word or two, and we prefix our remarks by saying that flies are most unnecessary as well as undesirable visitors to the garden.

The gardener should aim at cleanliness in everything and then flies will not be troublesome. His manure heaps if stacked otherwise than in the compost-yard should have a really good covering of soil, then the heaps will not breed flies and other filth. Rotted vegetable matter should not be left lying about, neither should fresh vegetable refuse such as cabbage leaves, etc. The pit in which vegetable matter decays should either be covered over with boards, or the vegetable matter itself covered with lime and soil. Should flies in spite of these precautions still appear, water animal or vegetable matter with a weak solution of formaline to kill the eggs.

In glasshouses every precaution should be taken against allowing the flies to become a plague. Fly papers should be hung up right through the spring, summer, and autumn months, and the papers will need renewing frequently especially as they are apt to become less effective if the houses are always being syringed down.

The gardener should also clean out his ditches more often than he does, mixing the ditch sludge (which breeds billions of flies) with lime and earth. After it has been stacked for about nine months it can be dug into the vegetable garden, where it acts as a somewhat powerful manure.—E. T. E.

FLIX-WEED.—See *SISYMBRIUM.*

FLORAL GUM.—See *EXHIBITORS' GUM.*

FLORID CLEMATIS (*Clematis florida*). See *CLIMBING AND TRAILING PLANTS.*

FLORIFEROUS ABELIA (*Abelia floribunda*).—See *CLIMBING AND TRAILING PLANTS.*

FLORISTS' FLOWERS.

In a sense all cultivated flowers are florists' flowers, but the term is meant to apply to certain species of plants which have, from their original forms, been evolved by the skill of the hybridist to a more comely appearance, more refined in shape, larger in size of flowers, more sweetly scented, or more highly coloured than occurred in their natural habit. In the majority of cases the evolution from a wild species to a florists' flower, brought about by a long series of intercrossings of chosen varieties, is simply an aggrandisement in form, size, or colour of the original wilding, as is the case in the Carnation, Rose, and Sweet Pea, but in several examples the hybridiser's skill has actually created what at first might appear to be a new flower, as for instance in the show Auricula, with its green, grey, or white edge, and in the complicated doubling of form as in the Japanese Chrysanthemum, or the Cactus, Pompon, and show Dahlia.

Propagation.—To propagate the named varieties of florists' flowers, cuttings, layers, or offsets are taken, as seedlings will not, or only seldom, perpetuate the fixed characteristics of the parents, and the vast majority of them will show a strong tendency to revert to a natural ancestry. Of course seedlings are the only source from which new varieties are evolved, but much skill and patience are required to advance still further the wonderful improvements already made. Long experience has shown that very high cultivation is required to achieve the best results in most of these specialised branches of horticulture, and the protection afforded by glasshouses has greatly assisted growers in the pursuit of their aims. Many florists' flowers, however, can be successfully grown in the open ground in a medium loamy soil enriched with farmyard or stable manure, using the former if the natural soil is light or too sharply drained, and the latter if of a clayey nature. For pot culture it is useful to have a stock of decayed turves at hand, as this, blended with old manure, leaf-mould, and a little sharp sand, forms a compost suitable for almost any plant.

Where a selection of varieties is given in the articles on each Florists' Flower in the list below, care has been taken to bring these as fully up-to-date as possible, but it should be borne in mind that hybridisers are still busy bringing out novelties, sometimes improvements and occasionally not, and consequently catalogues of named sorts of flowers are changing from year to year.

List of Florists' Flowers.

The following is a list of the flowers usually considered florists' flowers. The present writer treats most of them in short separate articles; but a few, such as *Crocus*, *Daffodil*, *Dahlia*, *Gladiolus*, *Hyacinth*, *Pansy*, etc., are dealt with by other contributors:—

Alstroemeria.
Amaryllis.
Anemone.
Antirrhinum.
Aquilegia.
Aster.
Auricula.
Begonia.
Calceolaria.
Canna.
Carnation.
Chrysanthemum.
Cineraria.
Crocus.
Cyclamen.
Daffodil or Narcissus.
Dahlia.
Delphinium.
Fuchsia.
Gladiolus.
Hollyhock.
Hyacinth.
Iris.
Ixia.
Lachenalia.
Lily.
Lobelia.
Paeony.
Pansy.
Pelargonium.
Pentstemon.
Petunia.
Phlox.
Picotee.
Pink.
Rhododendron.
Rose.
Saxifrage.
Sweet Pea.
Tulip
Verbena.

J. L. G.

FLORISTS' TULIPS.—See under Tulip Divisions in *Tulips*.

FLOTE GRASS (*Glyceria fluitans*).—See *Glyceria*.

FLOWER GATHERERS.—See *Garden Tools*.

FLOWER GATHERING.

It is frequently said that "any one can gather flowers"—a true enough statement in one way, but as in everything else there is a right and a wrong method of working. More often than not the wrong way with all its resultant evils is followed, especially by ladies gathering the flowers for the home, or by children who are allowed to do so. There is no wonder that some gardeners are very jealous of other folks being allowed to gather the flowers from the borders, as lack of care in this direction frequently means spoilt plants; but alas, gardeners themselves at times are sinners too, possibly owing to their ignorance of the correct way of working.

The "plucking of flowers," so dear to all ladies and young folks, is something which wants speedily stopping. As a flower lover the writer has probably seen more plants mauled by this careless, thoughtless plucking than most people, indeed wherever he has gone he has seen the same thing. Schoolgirls come home after finishing their education, and are given the task by their parents of "doing the flowers," so they go out into the garden and pull and pluck to their hearts' content. Titled ladies, too, are apt at times to fall foul of their gardeners, who have to make good the devastation resulting from the plucking of choice blooms by the fair female hand. This is all by the way, however: we will now come to the point without further talk.

How to Gather.—Pulling or plucking of flowers should be left to the Stone Age when there were no steel cutting-tools, and every flower whether it be required for a buttonhole or for indoor decoration should be cut with a knife, a pair of scissors, secateurs, or, better still, a special flower-gatherer. In cutting with a knife, grasp the flower firmly with the left hand and cut it off with the right. When using scissors or secateurs on taller plants, cut in such a way that the flower will gently slip down on to the tool, and not drop on to the ground. This is not always possible with the two tools just named, but if a proper flower-gatherer is used, there is then no chance of the flower falling to the ground and being spoilt, as the tool is constructed to avoid this.

Whatever tool is used, see that it is sharp. A dull tool will injure the plants, and make the flowers last less long in water. See also that the tool is perfectly clean, and always cut flowers with as long a stem as possible, since they can easily be shortened if occasion arises, but it is obviously impossible to lengthen them.

The best time for gathering flowers is a matter of opinion. Some well-known experts recommend cutting in the cool of the evening. This seems to the present writer to be a mistake. Being an early riser, out with no difficulty by six in the summer, he strongly urges flowers being cut between 6 a.m. and 7 a.m. with the dew upon them. Experience has shown that they last for a very long period when cut fresh in the early morning, longer than they do when cut in the cool of the evening after a hot day.

Some flowers are not suitable for cutting, and in order to avoid them we have included a list of *Flowers Unsuitable for Cutting* in this work.—E.

FLOWER STANDS.—See *Garden Furniture.*

FLOWERING ASH (*Fraxinus Ornus*). See *Trees.*

FLOWERING CURRANT (*Ribes sanguineum*).—See *Shrubs.*

FLOWERING DOGWOOD (*Cornus florida*).—See *Shrubs.*

FLOWERING NUTMEG.—The genus Leycesteria. See *Shrubs.*

FLOWERING PLANTS: Life History of.—See *Plant Physiology.*

FLOWERING RUSH (*Butomus umbellatus*).—See *Butomus.*

FLOWERING SHRUBS.

Undoubtedly flowering shrubs are quite indispensable in gardens where the charms of colour, form, and fragrance are prized, for no other class of subject which the gardener grows combines in a greater degree these desirable qualities. It is quite possible by a little study to have some shrubs in bloom nearly all the year round, and by the judicious arrangement and grouping of these plants most pleasing and wonderful effects are obtainable.

Shrubs for Walls.—First of all let us consider a few of the many purposes to which these delightful subjects lend themselves.

Some are splendid for clothing walls or fences, and of these we may mention: *Abelia chinensis* (delicate pink); *Berberidopsis corallina* (coral red); *Carpenteria californica* (pure white); Ceanothus in all its varieties; *Chimonanthus fragrans* (yellow); *Choisya ternata* (white); Cydonias in all their varieties, with orange, scarlet, blush, and white flowers; *Escallonia Langlevensis* (rosy-carmine); *Hydrangea quercifolia* (creamy-white); *Magnolia grandiflora* (white); and *Viburnums macrocephalum* and *plicatum*, with their clusters of white flowers and handsome foliage.

Rock Garden Shrubs.—Some flowering shrubs are seen at their best when planted in the rock garden, and splendid for this purpose are: *Azalea amoena* (crimson), flowering in early spring; *Berberis concinna* (pale yellow); *Berberis Wilsoni* (golden); *Cistus villosus* (rosy-purple); *Cytisus prostrata Andreana* (chocolate and gold); *Cytisus Kewensis* (creamy-white); *Cytisus purpureus* (purplish-red); *Daphne cneorum* (fragrant rosy-pink); *Daphne Blagayana* (ivory white); *Daphne fioniana* (pale rose); and *Genista anxantica* (golden-yellow).

Shrubs for Water Side.—Others such as *Berberis stenophylla*, the

Hydrangeas, *Leycestria formosa* (purple); *Spiraea Aitchisonii* (pure white); *Spiraea ariaefolia* (creamy-white); *Spiraea Lindleyana* (creamy-white), and most of the more vigorous growing flowering shrubs succeed on the verge of pool or pond.

Shrubs for Shade.—A collection of flowering shrubs for shady positions, including species that will thrive under trees, should contain *Berberis japonica* (fragrant yellow flowers); *Bupleurum fruticosum* (bright yellow); *Daphne Laureola* (yellowish-green); *Daphne Mezereum* (fragrant purple-red); *Hypericum elatum* (bright yellow); *Hypericum calycinum* and *H. Moserianum*, both of dwarf habit and with golden flowers; *Ligustrum japonicum* (creamy-white); *Olearia Haastii* (white daisy-like flowers); *Mahonia* or *Berberis Aquifolium* (golden-yellow); all varieties of the Ribes; *Rhododendron ponticum* (purple); all the Spiraeas mentioned above as well as the varieties *confusa* (white) and *Douglasi* (rosy-red); *Viburnum Tinus* (Laurustinus, white); *Veronica Traversii* (pale mauve), and all varieties of Weigelia.

Shrubs for Every Garden.—It is impossible in a short article to mention even by name one-half of the flowering shrubs worth growing, but let us for a moment consider a few of those which should be in every garden where space will allow. Most of those mentioned below are not rarities; indeed, most may be purchased for a very small outlay, but every one of them will repay the purchaser a hundred-fold by its beauty year after year, as it grows to maturity.

First of all we must place the Almonds, sweet and bitter (*Amygdalus dulcis* and *A. communis*). These are so well known that little description is needed, but to see them at their best they should be planted in bold groups, and this remark also applies to the beautiful double flowering Peach (*Amygdalus Persica flore plena*) with its rosy-red flowers.

We next come to the hardy Azaleas, and here it is a mistake to think they will grow only in peat, since they thrive exceedingly well in a good loamy soil, providing that the garden is not on a limestone subsoil. Their gorgeous colourings, orange, flame, salmon, softer pinks, and yellows, colours which never clash, make them well worth any extra trouble entailed in their cultivation.

Turning now to a different shrub, the Berberis, so many sorts are well worth growing that it is somewhat difficult to choose from the embarrassing number of varieties in cultivation. However, here are a few suggestions:

A charming little plant is found in *Berberis concinna*, a shrub 3 ft. high, with pale yellow flowers, and leaves of silvery grey on the underside. *B. Darwinii* is, of course, an old favourite, and its rich orange flowers followed by striking blue fruit are well known. *B. polyantha*, which grows 5 ft. high, retains its foliage until Christmas-time, and during November or December is a sheet of fiery scarlet. *B. stenophylla*, which grows about 6 ft. high, is simply smothered in spring with its flowers of brightest yellow, and makes a glorious hedge plant. *B. Thunbergii*, which rarely exceeds 1 yd. in height, bears yellow flowers, and in the autumn the foliage is gorgeous. *B. virescens*, growing 5 ft. high, is another fine subject for the autumn garden, and of stiffer and more upright habit than any of the other varieties mentioned; while *B. Wilsoni* is a dwarf but charming little shrub with golden flowers and brilliant leaves and berries in autumn.

All these Berberis are fine subjects for massing, and a very fine effect may be obtained by planting a bed or bank with *Erica carnea*, or *Erica mediterranea hybrida*, and using as dot plants either of the varieties *B. Thunbergii*, *virescens*, or *polyantha*, the vivid autumn colouring of the Berberis showing to special advantage against the dull green of the heather.

As an autumnal flowering shrub, *Buddleia variabilis Veitchii* and its companion *B. variabilis magnifica* are without rivals; they provide a special charm on a bright day in September when their sweetly scented long panicles of lavender coloured flowers prove a great attraction to Peacock, Tortoiseshell, and Red Admiral Butterflies, of which great numbers may be seen flitting from flower to flower. They grow about 10–12 ft. in height.

All the Ceanothus are charming, but *Ceanothus Gloire de Versailles*, a form of *azureus*, growing 8–10 ft. high, is quite the best, its rich blue flowers providing a lovely bit of colour from July to October; if planted with the beautiful hardy *Fuchsia Riccartoni*, a shrub with brilliant red flowers growing 6 ft. high, or with the Tamarisk (*Tamarix hispida*), with its feathery sprays of pink, a perfectly charming combination results.

The Japanese Flowering Cherries (*Cerasus japonica*), which grow about 30 ft. high, are amongst the best of the spring flowering shrubs; *C.j.H. Veitch* is usually recommended as the best, and an exquisite variety it is, with its rosy-pink flowers, but even better is the less common variety catalogued under the name of *Hesikura*, the flowers of which are a richer pink and are very freely produced. The young foliage of this sort is an additional attraction, being a delightful tint of soft bronze. The variety *Japonica Watererii* is a lighter pink than either of the preceding, though very lovely.

Amongst sweet-scented shrubs the Mexican Orange (*Choisya ternata*), growing 2 yds. in height, with its fragrant white flowers, stands preeminent, but excepting in warm districts this lovely evergreen should be grown against a south or south-west wall, as it is not perfectly hardy.

Another fragrant shrub flowering in the depth of winter is *Chimonanthus fragrans*, commonly but erroneously known as the Allspice. This too requires a wall upon which to train it, and it grows some 8 ft. high. Its yellow flowers with their exquisite scent are particularly pleasing in their season when frost and snow abound.

An evergreen shrub as hardy as the Laurel and with showy white flowers is the Rock Rose (*Cistus laurifolius*). This and the beautiful Gum Cistus (*Cistus ladaniferus*) are most desirable, and grow 4–6 ft. high. The dark reddish-brown blotches on the pure white petals of the latter shrub make it conspicuous anywhere.

Quite a number of our early flowering shrubs expand their flowers before their leaves, and the Cornelian Cherry (*Cornus mascula*), a shrub growing about 15 ft. high, is an effective example. Its yellow flowers are produced in great abundance in February, and for providing a mass of colour at this time of the year few shrubs equal it, especially as it thrives in any soil.

The Hawthorns (*Crataegus*) soon make small trees, and seem to thrive in any position; the double forms in pink, scarlet, and white are known to every one, but also deserving of cultivation are the varieties *C. Car-*

rierii and the Cock's-spur Thorn (*C. Crus-galli*), both of which grow 15–20 ft. high, and bear in the summer large white flowers, followed in the autumn with striking fruit and prettily coloured foliage. More of a curiosity is the celebrated Glastonbury Thorn (*C. Oxyacantha praecox*), a shrub growing 20 ft. high, and reputed to flower on Christmas Day, but which more frequently does so about mid-January.

Orange and scarlet flowers are always welcome, particularly in the early spring. The Japanese Quinces (*Cydonia japonica*), which grow 5–6 ft. high, brilliantly supply the needed colour, and are well worth growing, in bush form as well as in the form of wall plants. *C. Columbia* (carmine rose) and *C. Simonii* (blood red) are perhaps the best.

The Brooms (*Cytisus*) give us masses of colour which few flowering shrubs can equal. The White Broom (*C. albus*), *C. Andreana* (chocolate and gold), both about 6 ft. high, *C. Dallimorei*, with charming flowers of pale rose and mauve, and *C. praecox*, with its charming creamy-yellow flowers, both 4–5 ft. high, are well worthy of as much space as can be afforded in the garden; and a particularly pleasing way of growing them is on short stems as standards.

Most accommodating shrubs are the Deutzias, thriving as they do in any kind of soil and producing a mass of bloom in the early summer. *Deutzia crenata flore pleno* (double pink), *D. candidissima flore pleno* (double white), and *D. crenata Pride of Rochester* (pink and white), all about 6 ft. high, are as good as any of the many varieties; while *D. gracilis* (pure white, and of dwarf habit), growing as it does about 1 yd. high, is a fine variety both for the garden and early forcing.

The hardy Heaths (*Ericas*), which are so lovely, are given in an article to themselves, so that it must be enough to say here that they may be had in flower the whole year round providing the soil is suitable for their requirements. Much the same applies in the case of Rhododendrons which are, of course, indispensable flowering shrubs. These last are also dealt with separately. See article on *RHODODENDRON*.

In early spring no shrub is more attractive than *Forsythia suspensa*, growing 8–10 feet high, with its branches laden with golden bell-shaped flowers; and even more remarkably free-flowering, though scarcely so graceful in habit, is *F. intermedia spectabilis*, with flowers of a shade deeper yellow. Either of these shrubs grouped above a bed of Chionodoxas or Scillas makes a perfect picture.

No shrubs give a more delightful display in the autumn months than the Hardy Fuchsias. The variety *Riccartoni* has been mentioned previously, but *F. corallina* (carmine) and *F. gracilis* (crimson) are both highly recommended, and grow about 2 yds. in height.

Equally attractive in the winter is *Garrya elliptica*, a catkin-bearing plant of great beauty, growing 8–10 ft. high. The flowers are of soft grey and green tints, suffused with red. The plant is, perhaps, the most charming feature of a garden in mid-winter. Quite indispensable in the winter is the Japanese Witch Hazel (*Hamamelis arborea*), growing about 20 ft. high, with its quaint golden flowers produced in January. The forked branches of the latter shrub are used as divining rods.

Much greater use might be made of the shrubby Magnolias if it were generally known that they are amongst the hardiest of our shrubs. All they need is a sheltered position.

for their wax-like petals will not stand a blustering wind without injury. The Yulan Tree (*Magnolia conspicua*), growing 30 ft. high, with its large creamy-white flowers, *M. Lenne*, about 20–30 ft. high, rich purple, and also *M. Soulangeana*, growing 20–30 ft. high, with massive white flowers tinted purple, are the best of those of large growth. Of the smaller sorts *M. stellata*, which grows 2 yds. high and is the earliest to bloom, with its star-shaped flowers of purest white, provides a charming picture in March and April. If these Magnolias can be grouped with the Hardy Azaleas the effect produced will be superb.

The old Mock Orange (*Philladephus grandiflorus*), growing 10–12 ft. high, with its sweetly scented large creamy-white flowers, is well known, but a note should be made of the dwarfer hybrids of which *P. candelabre*, growing 3–4 ft. high, is conspicuous, not only in summer when a mass of bloom of pure white, but also by the warm colouring of its wood in winter-time.

All the Flowering Crabs (*Pyrus*) are beautiful. *Pyrus floribunda*, growing 20–30 ft. high, is rosy-crimson, and *P. floribunda atrosanguinea*, which is of similar height, is a deeper crimson. More than passing mention should be made of *P. Malus floribunda purpurea*, a flowering tree growing 20–30 ft. high, introduced recently, which may be expected to rival *Prunus Pissardi* in popularity when generally known. The flowers are a rich crimson, the young wood and foliage being a pleasing reddish-purple shade of colour, and the tree itself is of exceptionally graceful growth.

The best of the Flowering Currants is *Ribes atrosanguinea*, a shrub about 8 ft. high, bearing brilliant blood-red flowers. A really fine spring group may be had by massing this subject with either of the Forsythias previously mentioned.

Few shrubs equal and none excel the graceful and beautiful Rose Acacia (*Robinia hispida*), with its large pendulous racemes of rosy-pink flowers, and elegant fern-like foliage. Like all Acacias the branches of this plant are brittle and often injured by wind, so a sheltered spot is desirable when planting. It grows about 10–15 ft. high.

Blooming much later than the other Brooms that have been noticed, the Spanish variety (*Spartium junceum*), which grows 10–12 ft. high, makes a fine show in late summer and autumn with its bright yellow flowers and stems of rich deep green, and makes a splendid plant for massing. The same remark applies to *Spiraea arguta multiflora*, the best of all the shrubby Spiraeas, which grows about 4 ft. high. In the early spring this shrub, with its long pendulous branches smothered with pure white flowers, gives at a distance a resemblance to freshly fallen snow, and if bordered with *Muscari Heavenly Blue* makes an extremely pretty and dainty bed. *Spiraea Anthony Waterer* only grows 2 ft. high; with its rich crimson flowers it is of very different character, being compact and dwarf, and blooming from July until October. But of the many varieties to choose from this last should always form one of those selected.

Who does not love the Lilacs (*Syringa*), which delight in deeply dug and well-manured soil? There are varieties of the shrub to please everyone, both single and double, and ranging in colour from deepest purple to pure white. Amongst the best are *Alphonse Lavallee* (double lilac); *Charles X* (single reddish-purple); *Charles Joly* (deep double purple); *Madame Casimir Perrier* (double creamy-white); *Madame Lemoine* (double white); *Miss Ellen Willmott* (double white); *President Carnot* (pale double lilac); and *Souvenir de L. Spath* (dark single red).

A more beautiful sight than a mass of bank of the Double Gorse (*Ulex europaeus flore pleno*) is difficult to find. Commencing to bloom as it does in March, it is at its best about mid-May, and its glorious golden flowers should brighten many an odd bank or corner, for the poorer the soil the better does this plant thrive and flower.

No list of flowering shrubs would be complete without the Veronicas, which bloom so continuously. Unfortunately they are not all perfectly hardy, but where they will succeed the newer hybrids should certainly be grown, and in more exposed positions, *V. Traversii*, with its pale lavender flowers, and *V. salicifolia*, a pure white, may be depended upon. Both average 4–5 ft. in height.

The Guelder Rose (*Viburnum Opulus*), with its snowball-like flowers, produced in June, and our old winter flowering friend the Laurestinus (*Viburnum Tinus*) are known to all, and so to most will be *V. plicatum*, growing 4 ft. high, and *V. macrocephalum*, 10–12 ft. high. Both bear large heads of white flowers; but a newer and most attractive species is *V. rhytidophyllum*; this would be worth growing for either its flowers, its foliage, or its autumn berries of brilliant red, and its handsome and distinguished appearance throughout the year entitles this plant to be described as an aristocrat of the garden.—E. A. J.

[It should be noticed that the names used in the above article are those which are well known to gardeners and the gardening trade, and therefore do not correspond with those following the new nomenclature adopted at Kew. Thus *Amygdalus* is in the new classification included in the genus *Prunus*, etc. etc.—EDITOR.]

FLOWERS BENEATH TREES.—See *WILD GARDENING.*

FLOWERS, FLORISTS'.—See *FLORISTS' FLOWERS.*

FLOWERS FOR INDOOR DECORATION.—Perhaps the most perfect of all decorations for the house is found in a well-grown flowering plant, which lends grace and beauty to the simple cottage home, whilst even the stately rooms of a palace would look bare without flowers. Not only so, but the fragrance of opening blossoms has, as science tells us, a distinct value to health, for they breathe out ozone.

In January, when cut-flowers are scarce, we have the early *Polyanthus Narcissi* from Italy, the two earliest of these being the *Double Roman* Narcissus and the *Paper White* Narcissus, both highly fragrant; and these are quickly followed by *Narcissus Grande Monarque*, a very fine flower; *Jaune Suprême*, in golden-yellow; *Scilly White*, and many others.

Van Thol Tulips in scarlet and yellow, can be slightly forced for Christmas; and they should be followed by a selection of the second-early tulips, of which *Cottage Maid*, *La Reine*, and *Proserpine* are amongst the most dainty.

Scilla sibirica, Roman hyacinths, snowdrops, and crocuses in various hues, are all available very early in the year without forcing; which the *Van Thol* Tulips alone will stand.

Many charming arrangements in bowls of fancy china, etc., can be made by raising those bulbs which show colour at the same time, and covering them with fresh moss in tepid water, with far more satisfactory results than where the bulbs are grown throughout in the same pot; as, in that case, some flowers will appear before the rest, and the effect of the group is spoiled.

Lilies of the Valley (*Convallaria majalis*) can be obtained throughout the year by forcing; but it is difficult to induce the leaves to appear with the blossoms before February, even with retarded crowns.

Freesias in pure white, creamy-yellow blotched with orange, and various shades of pink, are most refreshingly fragrant, with a scent of mingled violets and cowslips. They are easily obtained in midwinter, if potted up in July and grown in the full sunshine out of doors until October, when they should stand on the shelf close under the glass of the greenhouse.

Pots of freesia bulbs can be started at intervals for a succession of these delightful flowers through the spring until the end of May, and their later blooms are often the finest.

In the early spring, too, we have many flowering shrubs which, if potted up in October, and forced very gradually, will make a rare show of bloom from February to May.

Deutzia gracilis, with elegant sprays covered with snowy blooms, is very easy to manage, only needing to be repotted every third year, and grown in the open air until it is placed in gentle warmth from January onwards.

White Lilac (*Marie Legrange*), and the purple variety *Charles X*, are the best for forcing; *Cytisus racemosus*, with its fragrant golden flowers; *Spiraea Thunbergi*; *Spiraea japonica*, in white or pale pink; *Amygdalus Persica fl. pl.*, the double crimsom almond; *Mackaya bella*, a lovely flower in lavender; the early Rhododendrons of the Himalayan and Caucasian groups (especially *R. nobleanum*, crimson, which flowers in February without fire heat) and the exquisite white rosettes of the Chinese plum (*Prunus sinensis fl. pl.*) may be obtained during the three first months of the year; and the Hydrangeas are available, by means of starting them in succession during at least six months.

The white *Hydrangea Dr Hogg* is one of the most useful and effective of room plants, for it will stand for several weeks in a shady place, where it retains the purity of its white blossoms much longer than in the sunshine. The pink *Hydrangea hortensis* and its blue variety are also handsome.

The beautiful azaleas of the East, *A. indica* and *A. mollis*, are perhaps the most perfect of decorative plants, in many shades of carmine, apricot, and crimson. They require plenty of tepid water at all times.

Pot-roses are not so often seen in a room as they should be; and yet they are amongst the most desirable of decorative plants. Pruned in January, and brought on very gradually in slight warmth, they will bloom in April and May.

During the summer there is, of course, a wide choice of pot-plants for room decoration, but those flowers which prefer a slight shade to the full sunshine, will prove the most satisfactory.

Tuberous Begonias, both single and double, do very well in an airy room; and the velvet-like foliage of *Begonia metallica*, with its pink and white flowers, is most effective. The dainty little plants of *Begonia Gloire de Lorraine* and its varieties are very popular in the autumn, and are most decorative.

The gorgeous blossoms of the Gloxinia too, although they need moist warmth until the buds are formed, will open well and last long in the semi-shade of a room.

Nicotiana affinis, handsome and fragrant as it is during the night, shuts its starry flowers and droops sadly when strong sunshine reaches it. But it can be induced to keep its blossoms open by means of growing it in a pot, which can be removed to the dark corner of the hall or the room in the evening, as soon as the blooms are open. They will not close in the shade for several days, when the plant should be returned to the open air until it has formed more flowers, and these are open. If kept in the shade too long the plant becomes weak and useless.

In the autumn there are various seedlings which are then ready to open their buds, such as *Primula sinensis,* in pink and white; *Cinerarias,* of which the blue varieties are the most desirable; and *Cyclamen persicum,* a plant which does remarkably well indoors if its foliage is kept free from blight by sponging with warm soap and water.

The waxen blossoms of the Winter Heath (*Erica hyemalis*) are very beautiful, and this plant is sold in large quantities in November for room decoration; but it needs careful watering, for its delicate hair-like rootlets soon become rotten in stagnant water, and yet the plant must not be kept very dry.

Poinsettias, with their flaming bracts in carmine, are at their best in December, when they may be grouped with the fine foliage and ivory spathes of *Calla aethiopica* (Syn. *Richardia africana*), the Arum Lily, with good effect in a room.

Perhaps the most festive of all pot-plants for Christmas decoration is *Libonia floribunda,* a neat little shrub with box-like foliage, which is completely covered with its fire-coloured blossoms in winter. It is nearly hardy, and needs but little warmth, but must have an abundance of water and a continual supply of rich food to do its best.

Zonal Pelargoniums, specially prepared for winter work, stand better in the dry warmth of a sunny sitting-room than many other plants. The variety *Henry Jacoby* is one of the best for winter-flowering; and the *Double Zonal* Pelargoniums have the merit of retaining their petals for a long time in winter, and are therefore very useful at that season.

The pretty hose-in-hose flowers of the winter-flowering Cactus, *Epiphyllum truncatum,* are available throughout the winter, and the effect of its hanging blossoms in a basket of fresh moss is decidedly good. Or it may be slipped into a bowl of olive-green china, where its brilliant tints in metallic crimson will be shown to the best advantage.—I. L. R.

FLOWERS FOR SEASIDE GARDENS. See ANNUALS, etc., in *SEASIDE GARDENS.*

FLOWERS FOR VERIEST AMATEURS.—See *GARDENING FOR THE VERIEST AMATEUR.*

FLOWERS: PACKING.—See *PACKING FLOWERS AND PLANTS.*

FLOWERS: SAVING SEED OF.—See *SEED SAVING.*

FLOWERS: TRANSPLANTING. — See *TRANSPLANTING.*

FLOWERS UNSUITABLE FOR CUTTING.—Although there are but few plants which are totally unsuitable for the decoration of our homes (if displayed in the right way) there are a certain number of flowers which suffer from some drawback to their general usefulness, either from their overpowering scent, from the shortness of their stems, or their heavy outline, etc.

These may be grouped as follows:—

Heavily Scented Flowers. — The most notable of these are:—*Brugmansia suaveolens, Choisya ternata,* *Citrus aurantium*, *Hedychium Gardnerianum*, *Hyacinthus syriacus*, *Lantana Sp.*, *Lilium auratum*, *L. auratum platyphyllum*, and *L. candidum*, Magnolias, *Philadelphus Sp.*, *Stephanotis Sp.*, and some other hothouse plants not commonly cultivated.

Flowers Closing in the Daytime.—These also are unsuitable for cutting. The best examples comprise *Nicotiana affinis* and *Œnothera Sp.* Likewise those which close in the shade, such as *Eschscholzia Sp.* and *Nymphaea Sp.*, are also unsuitable.

Short-stemmed Flowers. — These are only suitable for laying on wreaths of Smilax or Climbing Fern (*Lygodium*) in the Indian style of table decoration. They include *Gentiana acaulis*, Pansies and Violas, and many dwarf alpine flowers, such as Saxifrages, Sedums, etc.

Flowers of Stiff Appearance.—In this section we include also flowers of heavy outline. Notoriously unsuitable for cutting are Double Begonias (tuberous), China Asters, Dahlias, Daisies, Gaillardias, Paeonies, and Zinnias.

Amarantus Sp., *Antirrhinum Sp.*, *Calceolaria Sp.*, *Calendula grandiflora* and other species, *Aloysia Sp.*, Cockscombs, *Impatiens Balsamina*, *Lachenalia Sp.*, *Primula denticulata*, the taller Sedums, Sweet Williams, and *Trollius asiaticus* and *T. europaeus* are other flowers of this kind which are more or less unsuitable for cutting.—I. L. R.

FLUE DUST.—See *SOIL FUMIGATING.*

FLUEGGEA.—Now included in the genus *OPHIOPOGON.*

FLUELLEN (*Veronica officinalis*).—See *VERONICA.*

FLUORIDE OF CALCIUM. — See CALCIUM FLUORIDE in *LIME COMPOUNDS.*

FLUORIDE OF LIME.—The same as CALCIUM FLUORIDE. See *LIME COMPOUNDS.*

FLY POISON (*Zygadenus muscitoxicum*).—See *ZYGADENUS.*

FOAM FLOWER (*Tiarella cordifolia.* Nat. Ord. Saxifragaceæ).—Quite a unique little plant is that correctly known as the FOAM FLOWER as above, with its pretty heart-shaped leaves and its white flowers borne in April. Only growing about 6 ins. high, it makes a gem for edging perennial borders, and is exceedingly useful in the rock garden. A very dry sunny situation should be chosen for it.

More often than not, however, if FOAM FLOWERS are ordered at a nursery one does not get the above at all, but a handsome herbaceous perennial known incorrectly by the above name, and known botanically as *T. unifoliata.* This bears lovely rose flowers in May or June, and grows about 1 yd. high. It succeeds admirably under ordinary border cultivation, is easily propagated by root division in March, and is best planted in the early spring.

FOAM FLOWERS (*Tiarella unifoliata*). These are distinct from *FOAM FLOWER*, as mentioned in that article.

FOENICULUM (Fennel. Nat. Ord. Umbelliferæ).—Of the several species of this genus of hardy biennials, *F. dulce*, generally considered a variety of the COMMON FENNEL, is the most important. This is *F. officinale* of some authorities, and *F. vulgare* of Kew. Its culture, etc., is described under FENNEL in our article on *MEDICINAL HERBS.* It bears yellow flowers from June to August, and grows 2–3 ft. high. *F. piperitum*, popularly called ASSES' FINNOCHIO, is a less important species also with yellow flowers, but growing nearly 2 yds. high. This genus must not be confused with *FERULA* on which a separate article appears (the English name of which is GIANT FENNEL).—J. F.

See also under FENNEL in *MEDICINAL HERBS*.

FOENUM-GRAECUM.—Now included in the genus *TRIGONELLA*.

FOLDING FURNITURE.—See *GARDEN FURNITURE*.

FOLIAGE PLANTS FOR ALL PURPOSES.—The popularity of foliage plants arises not only from the recognition of the claims of any peculiarly beautiful kind or species, but because of their unending variety, and their inclusion of a sufficient number of subjects from which may be chosen examples that may fittingly be utilised in every branch of decorative horticultural effort. Briefly to indicate to what extent this is true, it may be observed that there are foliage plants that may be employed purely as isolated specimens, as upon the lawn, or as room plants in the dwelling-house; others suitable for covering all sorts of walls and for hiding unsightly buildings; others of immense value in the rock garden; and others, again, that are indispensable in the greenhouse and conservatory. Moreover, though in connection with these subjects the production of flowers is generally regarded as of secondary importance, quite a number of them have in this respect considerably more than a negligible value.

For the Garden.—To commence with foliage plants suitable for permanent planting in the garden beds and borders, it is quite impossible, so wide is the range available, to do more than direct attention to a few that are specially valuable.

In trees or shrubs, perhaps there are none so attractive as the Japanese Maples. Striking enough indeed when showing their tender foliage, the latter in maturity has gained much added beauty. Golden-bronze and vermilion, orange and fiery scarlet, pea-green and cinnamon—all these shades and many more are offered, together with beauty of form and lightness and grace, presenting what has been justifiably described as an artistic feast from which nothing is lacking. *Acer palmatum atropurpureum*, *A. p. dissectum*, *A. p. dissectum ornatum*, and *A. p. septemlobum elegans* are some of the best. Sheltered situations are desirable, but bear in mind that sharp contrast which the plants should provide. For the further provision of autumn tints, regard should be had to such as *Mahonia Aquifolium*, *Rhus Cotinus*, *Rhus glabra*, *Andromeda arborea* (a tall-growing tree with pure white, bell-shaped flowers), *Crataegus prunifolia*, *Euonymus europaeus*, *E. atrepurpureus*, Virginian Creepers (especially the self-clinging *Ampelopsis Veitchii*), and those wondrous climbers *Vitis Coignetiae* and *V. Thunbergii*, which in autumn assume the richest hues of yellow, orange, red, purple, scarlet, and crimson. For wreathing verandahs, old buildings, archways, pergolas, etc., the two last are climbing vines (deciduous) that cannot fail to be appreciated. When well established, *Vitis Thunbergii*, the more vigorous of the two, is a strong and free grower, quickly attaining imposing dimensions. Space will not permit of more than the briefest reference to the ornamental Conifers, such as *Abies pungens glauca pendula*, *Cedrus atlantica glauca*, *Cupressus lawsoniana*, the Retinosporas, Thuyas, etc., which are magnificent alike in form and foliage, but apt to be expensive, and are more particularly adapted to parks and pleasure grounds and gardens of large dimensions. To be similarly classified is, perhaps, *Taxus baccata erecta aurea,* a yew of which the great feature is the distinct rich golden-yellow foliage of the current season's growth. Then there are the hardy Bamboos, the importance of which for garden decoration is now more generally recognised. Of these, *Bambusa Nagashima* is very ornamental, and only averages 1–2 ft. in height; *Phillostachys Borgana* is very handsome and vigorous; *Bambusa palmata* grows about 3–6 ft. high, with Palm-like leaves; *Arundinaria japonica* has tapering leaves a foot long, smooth and shining above and glaucous beneath; and *Phyllostachys flexuosa,* 6–8 ft. high, is of neat habit, and valuable for those whose space is limited. The Pampas Grass (*Gynerium argenteum*) should also be referred to at this juncture. This is perfectly hardy, and vigorous in growth, soon forming a bold and handsome clump, while the stately plumes, cut and dried in the autumn, are much appreciated for indoor decoration. *Centaurea macrocephala,* 4 ft. high, with yellow flowers, and the New Zealand Flaxes, *Phormium tenax* and *P. t. variegatum,* also *P. t. atropurpureum,* are other good subjects.

For the Rock Garden.—Foliage plants suitable for the rock garden are simply legion. Confining attention solely to those of a dwarf, shrubby character, a good selection should include *Berberis dictyophylla, Cassinia fulvida, Othonnopsis cheirifolia, Santolina Chamaecyparissus, Yucca filamentosa,* and *Veronica decumbens,* as well as many Cotoneasters, Ericas, and miniature Firs, Junipers, and Pines.

Greenhouse Plants. — For the greenhouse, the variety is no less rich. Every taste can be met, likewise the conditions of every kind of house. Ferns alone might be specialised in, and would not be exhausted even by a lifetime of study. [For these, reference should be made to *FERNS* and *FERN GARDENING.*—ED.] Those noble subjects, the Palms, such as *Kentia Belmoreana* and *K. Fosteriana,* also *Chamaerops excelsa* and *C. Fortunei,* may be grown by all. The India-rubber plant (*Ficus elastica*) is another well-known favourite; so also the Norfolk Island Pine (*Araucaria excelsa*), *Grevillea robusta, Dracæna indivisa, Cyperus alternifolius,* the Castor-oil plant (*Ricinus Gibsoni*), and *Anthericum variegatum,* all of which are also employed, with the Palms and many Ferns, for dwelling-room decoration, and often survive a surprising amount of very rough treatment. Cannas, Centaureas (such as *C. candidissima* and *C. compacta*), *Zea quadricolor* (the variegated Maize), Brazilian Beet, and *Amarantus melancholicus ruber* are a number, out of many, that may be raised from seeds sown in a hotbed in spring. Oleanders and Brugmansias, the Scarborough Lily (*Vallota purpurea*), the wonderful Rex Begonias, as well as the rich-hued Crotons, Alocasias, and Caladiums, the decorative Coleuses, Aloes, Agaves, the Bertolonias (dwarf creepers, requiring moist heat, and best under a bell-glass), and, lastly, *Asparagus Sprengeri, A. plumosus,* and Smilax (including particularly *S. rubens*), with Maidenhair Fern, especially for cut foliage, must conclude a very incomplete selection, but one nevertheless entirely sufficient to demonstrate the great and attractive range from which the enthusiast may make his choice.

Treatment of Plants.—A final word may be added with reference to the treatment of foliage plants in rooms. With these, cleanliness is the great essential, entailing the frequent sponging of dust from such as the Aspidistra, Aralias, Palms, India-rubber plants, etc., and at all times removing excess of water from saucers and vases, to prevent the souring of the soil and the furring of the pots. With regard to water, this should always be given as soon as the surface soil has become slightly dry, but never before, and never more than the soil will absorb. Further, where there is a greenhouse of any kind, it will do much to keep the room plants in health if they are regularly moved backwards and forwards from one to the other. *Phoenix rupicola* and *P. reclinata*, *Aralia Sieboldi* and its variegated form, *Latania borbonica*, with *Yucca recurva* and *Y. gloriosa*, it should have been mentioned, are plants that are of exceptional merit for rooms, while several of the subjects named in the paragraph on greenhouse plants are also indispensable for what is known as sub-tropical bedding in summer.—W. F. M.

[For further hints on room plants, reference should be made to the article on *WINDOW GARDENING*.—EDITOR.]

FON GUMI (*Elaeagnus macrophylla*).—See *SHRUBS*.

FOOD FOR ALL CROPS.—See *FEEDING PLANTS*.

FOOD GARDENING, Need of.

The national importance of gardening has been forced upon the attention of the inhabitants of the British Isles during the past few years to an extent that was not foreseen by the great majority of those who took part in the previous remarkable development of flower culture, and most gardeners have learnt that much more serious consideration must be given to the production of food crops in the future. We had, as in so many other directions, allowed ourselves to depend to a dangerous extent upon the importations of potatoes and other vegetables, whereas the recent increase of home production has shown us the possibilities of independence. With regard to these possibilities some indication is afforded by the estimates of the Food Production Department, who tell us that in 1918 there were upwards of 1,400,000 allotments, being an increase of nearly two-thirds within a period of four years, and the same authority estimates that each allotment on the average produces approximately one ton of food per annum. Further, it should be remembered that this estimate takes no account of the production of food crops in private gardens, which in the aggregate must bulk very considerably.

Apart, however, from the vital question of national safety in the matter of the home-grown food supply, there is the not uninteresting mercenary aspect. Why should we continue to send money abroad for produce we can quite well grow in our own gardens? In order to realise the extent to which we have been doing this, it will be both interesting and instructive to refer to the report of the Board of Agriculture for the year 1913, the last complete year of import returns under normal conditions. In that year the oversea supply of raw vegetables was, in value, the highest on record, reaching nearly £5,500,000. The imports of potatoes amounted to nearly 9½ million cwts., the largest total since 1904, when nearly 10 million cwts. were received; and the total imported supply of onions was over 9,000,000 bushels. Be it noted also that Germany was sending us increasing supplies, whilst large quantities were coming from the Netherlands, and that in addition dried vegetables were coming in freely. These facts should be sufficient, without entering into details, to emphasise the need of food gardening upon the grounds of national safety and economy.

There are other and fairly obvious arguments to which brief reference only need be made. The difficulties and cost of transit will continue for some considerable time, so that the growth of vegetables in and around the centres of consumption is a desideratum, whilst those who have once grown their own will appreciate the greater freshness of the home produce as compared with that carried over long distances. But, apart from all such economic considerations, there is the very important effect of food gardening upon the physical and moral well-being of all who engage in it. Spade work, and the hours spent in close contact with Mother Earth out in the open air, are of immense individual and national benefit, and the countless city born and bred men and women who have recently taken up food gardening are now realising—to an extent they had never anticipated—a satisfaction of mind and body they could scarcely have attained by any other means.

J. W. H.

FOOD STORAGE AND DIGESTION.—See *PLANT PHYSIOLOGY.*

FOOD SYNTHESIS. — See *PLANT PHYSIOLOGY.*

FOOL'S PARSLEY. — A poisonous weed. See *ÆTHUSA* and *WEEDS.*

FOOTSTOOLS.—See *GARDEN FURNITURE.*

FORAGE COMFREY (*Symphytum asperrimum*).—See *SYMPHYTUM.*

FORCING FIGS.—See *FIG.*

FORCING FRAMES. — See *GREENHOUSES AND FRAMES.*

FORCING RHUBARB.—See *RHUBARB.*

FORCING VEGETABLES.—See *VEGETABLES : BLANCHING AND FORCING.*

FORD'S ELM (*Ulmus montana fastigiata*).—See *TREES.*

FORFICULA. — See EARWIGS in *INSECT PESTS.*

FORGET-ME-NOT (*Myosotis*, Nat. Ord. Boraginaceæ).—About forty species of Myosotis have been described, mostly with blue, rose, or white flowers, and are annual or perennial. Several of the latter are grown and treated as biennials. They are sown in the open on a finely prepared seed-bed in June or July, transplanted into lines to give them more room, and transferred to beds in October. Old plants are also allowed to ripen seeds, and the self-sown seedlings treated as above. If potted up, then they will bloom in the greenhouse during the winter.

Some Suitable Sorts.—A number of splendid varieties have been raised, and those mentioned below are varieties of *Myosotis alpestris*, *M. dissitiflora*, and *M. sylvatica.*

Azure Blue.—A variety of *Myosotis alpestris*, producing deep sky-blue flowers from June to August. Height, 4–9 ins.

Barr's Rosy Gem.—A variety of *Myosotis sylvatica*, producing rose flowers from April to June. It forms compact bushes 10 ins. high.

Jewel.—A variety of *Myosotis sylvatica*, giving bright sky-blue flowers from April to June. It makes spreading bushes that cover the ground, and its height is 9 ins.

Pillar Forget-me-not (Syns. *Sutton's Gem* and *Myosotis stricta*). —An erect or columnar strain of *Myosotis sylvatica*, giving blue, pink, and white flowers from April to June. Height, 6–9 ins.

Ruth Fischer.—A compact variety, giving large pale blue trusses of flowers from March to May. It is a splendid pot plant. Height, 6 ins.

Star of Love.—A hybrid between *Myosotis dissitiflora* and *Myosotis* *sylvatica* of dwarf compact habit, and producing large bright blue flowers from April to August. It is splendid for pot culture. Height, 5 ins.

Sutton's Bouquet.—A free-flowering strain of compact habit derived from *Myosotis sylvatica.* Its blue, pink, and white flowers are produced from April to June, and its height is 8 ins.

Sutton's Perfection.—An attractive strain of *Myosotis sylvatica,* producing large bright blue, rose, or white double flowers from April to June. Height, 9–10 ins.

Sutton's Royal Blue.—An early robust form of *Myosotis sylvatica,* producing large deep indigo flowers from April to June, in sprays suitable for cutting. Height, 12 ins.

Triumph.—A vigorous early flowering variety of *Myosotis sylvatica,* that makes a splendid pot plant to flower at Christmas. Grown outside, its bright sky-blue flowers are given from March to May, and its height is 9 ins.

Victoria.—A variety of *Myosotis alpestris,* producing large azure-blue flowers from June to August. Height, 4–9 ins.

White Lady.—A variety of *Myosotis sylvatica,* producing white flowers with a small yellow eye in April and May. Height, 10 ins.—J. F.

UP-TO-DATE SELECTIONS.

Myosotis alpestris Bijou.—Pink.
M. alpestris Pink.—Pink.
M. Royal Blue.—Deep blue.

See also *WATER GARDEN : PLANTS FOR THE.*

FORGET-ME-NOT : CREEPING (*Omphalodes verna*).—See *OMPHALODES.*

FORKED PINK (*Dianthus furcatus*).—See *DIANTHUS.*

FORKED SPLEENWORT (*Asplenium septentrionale*).—See *FERNS AND FERN GARDENING.*

FORKS.—See *GARDEN TOOLS.*

FORMAL STYLE.—See *GARDEN DESIGN, GARDEN PLANS,* and *LANDSCAPE GARDENING.*

FORMALINE.—See *SOIL FUMIGATING.*

FORMICIDÆ.—See ANTS in *INSECT PESTS.*

FORSYTHIA.—For the best species see *CLIMBING AND TRAILING PLANTS.*

FOTHERGILIA.—For the best species see *SHRUBS.*

FOUNTAINS AND WATER GARDENS. See *TOWN AND CITY GARDENING.*

FOUR-YEAR ROTATION.—See *ROTATION OF CROPS AND DOUBLE CROPPING.*

FOX GRAPE (*Vitis Labrusca*).—See *CLIMBING AND TRAILING PLANTS.*

FOX-TAIL GRASS.—See *ALOPECURUS.*

FOX-TAIL GRASS, BRISTLY.—See *SETARIA.*

FOX-TAIL LILY.—See *EREMURUS.*

FOXGLOVE (*Digitalis*, Nat. Ord. Scrophulariaceæ).—Some eighteen species of biennial and perennial Foxgloves are known, though comparatively few of them are grown to any extent. The Common Foxglove (*Digitalis purpurea*) is a well-known woodland plant, and is thus useful for the wild garden, for shady borders, and for margins of shrub borders. It is a plant of decided medicinal value, and reference should be made to our article on *MEDICINAL HERBS* for further particulars.

Biennial Border Species.—The four sorts described below are exceedingly useful, but the second is the most showy. They may all be raised from seeds sown in an open or half-shady part of the garden in April and May, but it is advisable to thin out or transplant the seedlings when quite small to get large plants for beds and borders.

Digitalis alba.—This bears white spotted or spotless flowers from June to September, and grows 3–5 ft. high.

D. gloxinæflora (GIANT SPOTTED).—This sort is available in many colours, and the flowers, which resemble Gloxinias on account of the large spots upon them, are produced from July to September, on plants 3–5 ft. high.

D. monstrosa.—This sort may be had in various charming colours, and its large bell-shaped top flower borne from July to September is distinctly attractive. Its height is 3–5 ft.

D. purpurea (COMMON FOXGLOVE). — This is a well-known purple sort flowering from July to September, and growing 3–5 ft. high.

Perennial Border Species.—These are of the easiest culture in any good garden soil. They merely require to be kept clean by hoeing the beds and borders. Most of them may be increased by division of the roots in the autumn or spring, but all can be reared in quantity from seeds. Most of the perennial sorts are curious and interesting, though not so showy as the common Foxglove. We recommend the following selection :—

Digitalis ambigua (Syns. *D. grandiflora*, *Milleri*, and *ochroleuca*).—This bears large buff-yellow flowers, which may vary in their shades. The plant blooms in July and August, and grows 2–4 ft. high.

D. dubia.—A synonym for *D. media*, which see.

D. ferruginea (Syn. *D. aurea*).—This short-lived perennial bears very numerous small rusty brown flowers in July and August, on plants 4–6 ft. high.

D. laciniata.—This sort bears small yellow flowers in June and July, and grows 1½–2 ft. high.

D. lanata.—This sort bears brownish-white or grey flowers, with a white or pale purple beardless lip, from June to August. Its height is 2–3 ft.

D. lutea.—This bears numerous light yellow flowers in July and August, and grows 2 ft. high.

D. mariana.—This bears pretty rose flowers from June to August, and grows 1½ ft. high.

D. media.—(Syns. *D. dubia* and *D. minor*).—This bears large pale purple flowers in June and July. Height, 6–9 ins.

D. orientalis.—This species produces small white flowers in June and July, and grows 1½ ft. high.

D. Thapsi (MULLEIN FOXGLOVE).—This attractive sort bears large purple flowers with red spots within, from May to August, and grows 2–4 ft. high.

D. tomentosa.—This useful sort produces large red flowers from June to August, and grows 2–4 ft. high.—J. F.

See also *DIGITALIS*, *MEDICINAL HERBS*, and *WATER GARDEN: PLANTS FOR THE.*

FRAGARIA (Nat. Ord. Rosaceæ). From this genus have originated the delicious GARDEN STRAWBERRIES we are all so fond of. *F. elatior* is popularly known as HAUTBOIS, while *F. vesca* (Syn. *F. mexicana*) is the well-known WILD STRAWBERRY. For details of culture and varieties to grow see article on *STRAWBERRIES.*

FRAGRANT PINK (*Dianthus fragrans*). See *DIANTHUS.*

FRAGRANT ROSES.—See ROSES FOR FRAGRANCE in *ROSES FOR ALL PURPOSES.*

FRAGRANT TEA ROSES.—See under TEAS in *ROSES FOR ALL PURPOSES.*

FRAME CUCUMBERS.—See *CUCUMBERS (FRAME).*

FRAME MELONS.—See *MELON.*

FRAMES.—See *GARDEN FRAMES* and *GREENHOUSES AND FRAMES.*

FRANCOA (Bridal Wreath. Nat. Ord. Saxifragaceæ).—This is an acquisition to any greenhouse and of the easiest culture. Sow the seed in March in slight bottom heat. A dry sandy loam suits it best. Temperature required, 40–45° F.

Greenhouse Species. — *Francoa ramosa.*—Pure white blooms, freely produced on long branching spikes. Flowers from July to August. Height, 2 ft.

F. sonchifolia.—Purple. Flowers from July to August. Height, 2 ft.

FRASER'S SILVER FIR (*Abies Fraseri*).—See *TREES.*

FRAXINELLA (*Dictamnus.* Nat. Ord. Rutaceæ).—We do not know which is the most common name for this excellent hardy perennial, Burning Bush or Fraxinella. Botanically it belongs to the genus Dictamnus. An attractive plant at all times and specially when in bloom ; it is inflammable, as many know to their cost who have thrown a lighted match, after lighting their pipes, into a clump or bed of this. We remember seeing a magnificent lot of it in St. John's College Garden, Oxford, when we were there last year.

Culture.—This is not a matter of any difficulty. The plants will succeed in any ordinary rich garden earth in a sunny or very lightly shaded spot. They dislike wet sunless spots, however. It is best to buy plants of them and plant them in February or March, as plants raised from seed are at least two years before they flower and sometimes take longer still. Propagation may be effected also by division of the roots, though this is not as easy as it is in the case of some plants.

What to Grow.—We recommend the following as being suitable sorts for the garden :—

Dictamnus albus.—This is a white sort blooming in May and June, not so showy as some, averaging about 3–4 ft. in height. The following are varieties of it :—

D. a. Fraxinella (Fraxinella).—This sort bears brilliant red or crimson flowers from June onwards, and averages about 1 yd. in height.

D. a. himalaicus.—This is a purple sort not as good as the former variety. It blooms freely, however, in May and June, and averages about 2 ft. high.

D. a. purpureus (Burning Bush).—This is probably the most popular and attractive sort of all. It bears reddish or purplish flowers throughout the summer, and these readily catch fire at night, if a spark falls on them. The plant averages about 1 yd. in height.

D. a. tauricus (Syn. *D. angustifolius*).—This is a very tall sort producing light purple flowers in May or June. It often exceeds 2 yds. in height.

D. angustifolius, D. Fraxinella, D. himalaicus, D. Limolayensis, D. purpureus, and *D. tauricus* are not now recognised as distinct species, but as varieties of *D. albus* above.

FRAXINUS.—For the best species see *TREES.*

FREESIA (Nat. Ord. Iridaceae.)

Freesias are bulbous plants with small sword-like leaves, and tubular flowers arranged in a row at right angles to the top of the stem. They come from South Africa and, like Lachenalias and Nerines, are just not hardy. They are, however, easily cultivated in pots in cool greenhouses, and as the greater number of the varieties are sweet-scented, they are highly prized either for cutting, or as pot plants for the house from Christmas to the end of March, which may be taken to be their normal flowering season under glass in the British Isles.

Since the Jubilee Exhibition at Haarlem in 1910, numerous coloured varieties have been placed upon the market. The present writer believes there is a great future before them, if, as seems likely, brighter and more decided colours can be obtained, and the delicious fragrance of the old *Freesia refracta alba* retained.

Culture.—Freesias should be potted between the first of August and the middle of September; after this date the results are never quite so satisfactory as from bulbs potted earlier. Any good, rich, light porous soil suits them, with plenty of drainage, and 5–6 inch pots are the most useful sizes. Plant the bulbs 1 in. apart each way, so that ½ in. of soil covers the top of the bulbs. Many growers when the potting is done early in August, stand the pots out of doors on a hard bottom, and only house them or put them in cold frames when frost comes. It is best, however, to put the coloured varieties at once in cold frames or in a cool greenhouse, as their bulbs seem to need just a suspicion of warmth to start them, otherwise some may remain dormant a whole year. Do not plunge the pots overhead in either fibre or ashes.

The temperature at which they do best ranges from 45° F. at night to 60° F. on a sunny day. They like plenty of air, and repay feeding once or twice a week with some weak stimulant, when the flower stems show themselves, but not before. This should be continued until the foliage starts turning yellow, after which water must be gradually withheld till the foliage is quite dead. The pots should then be put in some dry, sunny place to get the bulbs well baked. They may be shaken out and graded in July, ready for planting again in August.

Raising Seedlings.—This is easily done. The varieties cross freely with one another; but hand fertilisation is essential for the best results. The seed will be ripe in June, and may be sown in 7–8 inch pots in July or early August under grass, in gentle warmth if possible, giving abundance of light and air. Grow them on all the autumn and winter in the same way as other Freesias, but be very sparing with the application of stimulants, if any are used at all. Be most careful when shaking the little bulbs out to get all the bits that belong to each one together. To facilitate this, every seed when sown should be ¼ or ½ in. every way from its neighbour.

Varieties.—The following selection contains the best sorts, all of which flower freely from January to March:—

Freesia Abundance.—A mauvy-rose sort turning to rose with age, and growing 18–20 ins. high.

F. Bluebeard.—A soft bluey-mauve sort. Height, 15 ins.

F. Buttercup.—A deep yellow sort. Height, 15 ins.

F. Canary.—A pale yellow sort. Height, 15 ins.

F. Chapmanii.—A rich, deep yellow. Height, 15 ins.

F. Contrast.—A white sort with conspicuous orange blotch. A very attractive variety about 18 ins. high.

F. Dainty.—A tall rosy-mauve sort. Height, 18–24 ins.

F. La Chamante.—An apricot-rose sort. Height, 15 ins.

F. Leichtlini major.—A cream sort with yellow marking. Height, 15 ins.

F. Purity.—A pure white sort. Height, 15 ins.

F. refracta alba.—A white sort with yellow blotch. Height, 15 ins.

F. Rosa Bonheur.—A rosy sort. Height, 18 ins.

There are several people in

England now working on Freesias, so in a short time new colour varieties will be in commerce. Messrs. Herbert Chapman, Dalrymple, & Jacob have already received awards from the R.H.S. for their seedlings. Several firms sell seedlings in mixture. These, if a good strain is guaranteed, give pleasing results.

J. J. & E. T. E.

Up-to-date Selections.

Freesia Albatre.—White, blotched yellow.

F. Apotheosis.—Carmine-rose and lemon.

F. Beauty.—Rosy-mauve.

F. Delight.—White, rose-mauve margin, and yellow.

F. Elder's White Giant.—White and yellow. Scented.

F. Fairy.—Lavender, white, and marked orange.

G. Giant White.—White and orange.

F. Golden Oriole.—Yellow and orange-yellow.

F. Grey Dawn.—Lavender-grey and white.

F. Jubilee.—Rose, white, orange, and carmine-rose.

F. Maryon.—Mauve-lavender and white.

F. Mrs. R. F. Felton.—Creamy-white.

FREMONTIA.—For the best species see *Climbing and Trailing Plants* and *Shrubs.*

FRENCH BEANS. — See Climbing French Beans in *Beans.*

FRENCH GARDENING.

With the help of standardised frames and lights, also of bell-shaped glasses or cloches and an ample supply of horse manure, gardeners can obtain from the last week in February to the end of the year a large succession of vegetables from a comparatively small area of ground, which rarely exceeds three acres.

The system consists:—

First, of a few varieties of vegetables grown together, and at the same time, either under glass or outside. They are so selected that one crop comes to maturity before the other requires more space for its natural development.

Secondly, of the planning of the year's work, so as to utilise constantly and to the best advantage right through the year all the frames and bell-glasses.

To do this the plan generally adopted is as follows: From August to December, plants of Cauliflowers and Lettuces are raised and grown to supply the requirements of the spring work, which begins with the new year by the making of hotbeds and cold beds for a supply of Carrots, Cauliflowers, Lettuces, Radishes, and Turnips for the market from the last week in February till late in June.

Early in May the frames and bell-glasses will be removed from the above-named crops, which will then complete their growth in the open air, and the material will be at liberty for such crops as Beans, Cucumbers, Melons, and Vegetable Marrows.

The vegetables grown under that system are divided in two classes:—

(*a*) "Main crops," such as Cabbages, Carrots, Cauliflowers, Cucumbers, Melons, Turnips, which require one to three months to fill up the room necessary to their full growth.

(*b*) "Catch crops," including Endive, Lettuces, Radishes, Spinach, which are either sown or set among the main crops, and are ready for consumption before these are fully established.

The success of French Gardening depends chiefly upon each crop being ready within its allotted time, or, failing this, it would mean the deterioration of the crop grown with it, and spoil the routine of the work for the season. Each crop must be kept in perfect growth from sowing onwards, and is either transplanted or thinned out when it is needed.

Such results can only be obtained by great care in all practical details of cultivation such as: Ventilation, Sheltering, Watering, and above all scrupulous cleanliness in the work.

Material.—The chief appliances used in this method of gardening are:—

First, the Frames. These are shallow structures; the front is 7 ins. wide and the back 9 ins., made to hold 3 lights 4½ × 4½ ft. They are easily portable and are always set in rows of five each.

Secondly, the Bell-glasses or Cloches are 18½ ins. in diameter, and 126 set in three rows occupy the same space as a row of five frames.

Laying Out of a Garden.—The frame is the basis in the planning of the ground. This is divided in plots 65 ft. long, each being sufficient to accommodate rows of five frames.

The width of a plot rarely exceeds 60 ft., to save labour in the carrying, and a 4-foot path is allowed between each plot. It is essential to reserve a sheltered corner for the nursery beds for rearing all spring seedlings. The plot allotted for the hotbeds must be conveniently near to the manure stack, and it should be well drained. The quarters for the Cucumbers and Melons, and also the rearing of all Cauliflowers and Lettuce plants through the winter, are changed every year for the benefit of crops which will be grown subsequently in those quarters.

Manure.—The only manure suitable for this system of culture is horse straw manure. It is used: First, as a means of heat production for the benefit of the early crops in the spring. Secondly, after the decay has set in in the early summer it becomes humus for the crops from June till late in the autumn. Thirdly, during the winter it is broken up, and under the action of the weather pulverises into a fine compost, which is used as soil for the crops the following year.

The manure should be collected all the year round and put in stack. Care is taken to facilitate the escape of gases emanated through fermentation by placing long wood funnels in the middle of the stack. The manure in the stack gets quite dry, and when making the hotbeds it is mixed with fresh; the two together produce a steadier and more constant heat than fresh manure alone.

Hotbeds.—These beds are started from the middle of January; they are built with an equal quantity of dry and fresh manure, which should be well mixed together. Eight to ten tons are necessary to construct a bed 10 ins. thick, 5 ft. wide, and 67 ft. long, sufficient to accommodate five frames or one hundred and twenty-six bell-glasses. The inside of the frames is filled with the decayed manure obtained from the beds made the previous year. A 10-inch path is allowed for between each row of frames, and this is filled with fresh manure every fortnight to maintain an even temperature in the frames.

A different method is practised for Cucumber and Melon beds, as these are only wanted early in May. A trench 2½ ft. wide and 8 ins. deep is dug out and filled next with good manure. The frames are then placed over the trench, and they are filled with the soil from the next row.

At the end of the season the manure in these beds is broken up two or three times till it is fine. Two-thirds of the quantity is kept as soil for the following year's work, and the remainder is available for manuring or top-dressing the beds in the open ground. It is a verrich compost and quickly assimilable by all kinds of crops.

Cold Beds.—To obtain a constant succession of produce from a French Garden, one-third of the material is reserved for what is known professionally as *cold work.* On a plot of ground heavily manured and well dug before Christmas, frames or bell-glasses are set the same way as they are on the hotbeds. The same rotation of crops is sown or planted, and these receive similar treatment. Though the produce is later, it is superior in quality to that grown on hotbeds, and this is due to the plants growing more naturally. This method is very remunerative, and its success depends entirely upon the quantity of decayed manure available for filling the frames.

THE YEAR'S WORK.

The plan of work generally adopted by the majority of growers is as follows :—

August 1st to 8th.—Sow in the open Spring Cabbage and Onions. Sow in frames Little Gott Cabbage Lettuce for use before Christmas.

September 1st.—Plant Little Gott Lettuce in frames (150 plants to each frame).

September 15th.—Sow in frames Snowball Cauliflower for hotbed work and All Year Round Cauliflower for cold work.

October 1st.—Sow in frames All Year Round Cauliflower for growing in the open ground. Plant Spring Cabbages in the open ground.

October 5th.—Sow in frames or under bell-glasses Little Gott Lettuce for hotbed work.

October 8th to 12th.—Sow Passion Lettuce (Black Seed) for cold work, and Paris Grey Cos Lettuce for bell-glasses on hotbeds.

October 10th to November 10th.—Prick out all Cauliflowers in frames (750 per frame), and Lettuces under bell-glasses (30 plants per bell-glass), in their winter quarters.

November 15th. — Sow Passion Lettuce very thinly in frames for growing in the open.

November and December.—Break up all manure beds and prepare the ground for the cold work.

January 1st to 15th.—Sow broadcast in the cold bed Early French Breakfast or Wood's Frame Radish, also Chantenay Carrot, setting over Passion Lettuce (75 plants per frame).

January 15th to February 28th.—Make up the hotbeds for frames and bell-glasses. Sow broadcast Early French Breakfast Radish and Early Parisian Carrot in the frames setting over Little Gott Lettuce (150 plants per frame). Chantenay Carrot is sown on the beds for bell-glasses, and three Little Gott Lettuces and one Paris Grey Cos Lettuce are set under each bell-glass.

February 15th to March 15th.—Sow on hotbeds in the nursery quarters All Year Round Cauliflower and Chemin or White American Celery, also in cold frames Paris White Cos Lettuce for planting outside.

March 15th to 31st.—Plant Snowball Cauliflowers on the hotbeds (24 per frame), also All Year Round Cauliflower for the cold work (15 per frame). Sow Snowball or Half-long Turnip on hotbeds. (When Turnip is sown on hotbed a batch of Lettuce is first grown from plants set in January, and the Turnip is sown after the marketing of that crop.) Plant Passion Lettuce and Cos Lettuce outside. Sow the first batch of Cantaloup Melon and Tomato in the nursery beds.

April 1st to 15th.—Sow in drills Kidney Beans and Turnip in cold frames. Plant Cauliflowers outside. Sow the main patch of Cantaloup Melon, and also Vegetable

Marrow in the nursery beds. Sow the main batch of Cauliflowers and Broccoli for autumn supply outside.

April 15th to 30th.—Sow Beetroot and Turnip outside.

May 1st to 8th.—Sow the first batch of Telegraph Cucumber and the last lot of Cantaloup Melon in the nursery beds.

May 8th to 31st.—Make up and plant the Melon and Marrow beds. Prick out the Celery plants. Plant the spring sown Cauliflowers and also Tomatoes in their final quarters. Sow the last batch of Cucumbers in the nursery beds.

June 1st to 20th.—Plant the last batch of Melons. Make up the beds for Cucumbers. Plant the main batch of Celery in the open ground.

June 20th to 30th.—After the marketing of Cauliflowers grown on the hotbeds, the beds are forked over lightly and the space is filled with White Celery or another batch of Cauliflowers.

July 1st to 15th.—Plant the last Cauliflowers.

July 15th to 31st.—Sow Chantenay Carrot on the old bell-glass beds, also the last Kidney Beans outside; these will have the shelter of the frames to complete their growth early in September.

SOME PRACTICAL POINTS.

Experience has taught French gardeners:—

First: Cauliflowers must be sown in rich soil and not before September 15th, or they will show bud too early in the spring.

Secondly: If Cauliflowers are sown after May 8th they will not come to maturity before the frost.

Thirdly: Red varieties of Celery are unsuitable for planting on the old hotbeds.

Fourthly: Tomato plants must be stopped before July 15th in order to ripen all the fruits.

Fifthly: Turnip sown under glass must receive ventilation daily.

Sixthly: Turnip sown outside before April 8th rarely gives satisfaction.

Seventhly: Six weeks are necessary to rear Cucumber or Melon plants suitable for setting in their final quarters.

Eighthly: Endive must always be sown under glass before June 15th, and should germinate within 60 hours, or it will run to seed.

Ninthly: Bean seeds should hardly be covered to ensure an even germination.

Tenthly: When pricking out any kind of seedlings, all weak, drawn, or overgrown plants are disregarded.

DISEASES. — Vegetables grown under the French method are practically immune from most diseases and insects so prevalent in ordinary gardens: this is probably due to the constant activity of the plants and the high fertility of the decayed manure, which render them sufficiently strong to resist such attacks. Exception must, however, be made for the mildew, *Peronospera ganglioniformis*, which fungus destroys a large quantity of Lettuce plants in their winter quarters. No effective cure is known so far, but as a preventive, it is advisable to scatter ½ lb. of powdered Copper Sulphate to every bed (65 ft. long) a fortnight previous to the transplanting of the young seedlings. Should the disease appear, the attacked plants are covered with flowers of sulphur, and though it kills them, it checks the disease from spreading.

Lettuces set either in the cold work or outside outgrow the mildew, but care must be taken to set only healthy plants on the hotbeds.

P. A.

FRENCH HONEYSUCKLE.—(The genus HEDYSARUM and *H. coronarium*).—See *HEDYSARUM* and *SHRUBS*.

FRENCH LAVENDER (*Lavandula Stoechas*).—See *LAVANDULA*.

FRENCH MARIGOLD (*Tagetes patula*). See *MARIGOLD*.

FRENCH RANUNCULUS.—See under TYPES and VARIETIES in *RANUNCULUS*.

FRENCH ROSE (*Rosa gallica*).—See *ROSE SPECIES*. For the best varieties see *ROSE CLASSES*. See also under ROSE, FRENCH, in *MEDICINAL HERBS*.

FRENCH SORREL (*Rumex scutatus*). See *RUMEX*.

FRENCH TAMARISK (*Tamarix gallica*).—See *SHRUBS*.

FRENCH WILLOW (*Salix triandra*).—See *TREES*.

FRIENDS OF GARDENERS.—See *INSECT FRIENDS*.

FRINGE-FLOWERED ASH (*Fraxinus dipetala*).—See *TREES*.

FRINGE-TREE.—(The genus CHIONANTHUS and *C. virginica*). See *SHRUBS*.

FRINGED BUCK BEAN (*Limnanthemum peltatum*).—See *LIMNANTHEMUM*.

FRITILLARIA.—See *CROWN IMPERIAL* and *FRITILLARY*.

FRITILLARY (*Fritillaria*. Nat. Ord. Liliaceæ).—Fritillarias compose a large family of bulbous plants with flowers of varied form, size, and colouring. The striking characteristic which runs through them all is their nodding or drooping bell-shaped and generally chequered flowers. The best and widest known species is the old *CROWN IMPERIAL* (*F. Imperialis*), on which a special article appears. *F. Meleagris*, the well-known SNAKE'S-HEAD FRITILLARY, is a native of Great Britain, and used to be abundant in the meadows at Oxford. Both it and *F. latifolia* have given rise to numerous colour forms. As a rule all the different varieties and species flower in April or May.

Culture.—Pheasants are very fond of the bulbs of *F. Meleagris* and other varieties: thus where these birds are plentiful, culture should not be attempted. Any good garden soil suits them. Some of the smaller ones, such as *F. armena* and *F. aurea*, are very useful for warm places in the rock garden. The varieties of *F. Meleagris* may be naturalised in thin woodland where the shade is not heavy. In such positions the bulbs should be put 6 ins. deep. The varieties of *F. latifolia* are nice in pots.

Species and Varieties.—Some of the best are briefly described below:—

Fritillaria armena.—This is a yellow-flowered species which blooms in April, and grows 6–8 ins. high. There is also a red variety.

F. aurea.—This bears rich chequered golden-yellow flowers, which open in April. It grows 8–10 ins. high.

F. latifolia.—This has broader leaves than *F. Meleagris*, otherwise it is very similar. The flowers are chequered and of some shade of green, yellow, brown, or purple. They appear in April or early May, on plants 10–12 ins. high. There are many colour variations of which some of the best are: *Beets* (bronze-red and yellow); *Erasmus* (yellow and brown); and *Lola Montez* (green and purple). The names, however, are very unreliable.

F. Meleagris (SNAKE'S-HEAD FRITILLARY).—This has chequered flowers which vary from a dull purple to pure white, and which are usually produced in April or early May. The average height is 12–15 ins. As in the case of *F. latifolia* there are numerous named colour varieties, but it is sufficient to mention by name *F. Meleagris alba*, which bears pure white flowers.

F. pallidiflora.—This bears pale yellow flowers in May, and grows 12–14 ins. high.

F. pudica.—This bears yellow

flowers in April, and grows 6 ins. high.

F. pyrenaica.—This is a handsome plant with rich plum-coloured chequered blooms which expand in May. It grows 15–18 ins. in height.

F. recurva.—This has orange-scarlet chequered flowers in May, and grows about 12 ins. high.

F. verticillata (Syn. *F. Thunbergii*).—This bears cream-coloured flowers in May, and grows about 12 ins. high.—J. J. & E. T. E.

FROG HOPPER.—See under CUCKOO SPIT in *INSECT PESTS.*

FROST GRAPE (*Vitis vulpina*).—See *CLIMBING AND TRAILING PLANTS.*

FRUIT BARK BEETLES.—See *INSECT PESTS.*

FRUIT BORDERS.

These should be thoroughly well prepared before any planting is done—the best mode of procedure being to trench them a yard deep. Plenty of old manure should be worked in well down, and artificials suitable for the season and soil (see article on *ARTIFICIAL FERTILISERS*) should be added to the two top spits.

Fruit borders outside fruit houses should be cropped very lightly, and certainly not with a gross-feeding crop such as potatoes. Hardy herbaceous perennials with fibrous roots may be planted thereon, also surface-rooting vegetable crops.

All fruit borders should have a heavy dressing of old manure lightly forked into them every spring and should be kept scrupulously free from weeds.

FRUIT BOTTLING AND PRESERVING. — The practice of bottling one's own fruit at home is an art which has, unfortunately, fallen almost into disuse in this country; but the past war has opened our eyes to the many economies hitherto little practised, and this is one of the operations which may well be revived. Much fruit has been wasted by lack of knowledge in this direction, and it is hoped that the hints which follow may prove successful in preventing waste, and be a means of providing fruit to all households in the winter and at times when it is most difficult and exceedingly expensive to buy. There are three essentials in this work: first, cleanliness; second, strict attention to details; and thirdly, common sense.

Everyone knows that fruit will quickly go bad if it is not consumed within a certain definite period, and most people know that if it is put into bottles in the ordinary way it will also go bad very quickly; but if the bottles are *sterilised*, namely, heated up to a temperature at which all the germs contained are killed, and so that the air is partly driven out, the fruit keeps perfectly, and it is on this principle that fruit bottling depends.

Apparatus Required. — The idea among amateurs that fruit bottling is very expensive has but little foundation in fact. Simple apparatus is required, and once this is obtained it will last for a long period. First of all, the purchase of proper vacuum bottles is found to be the cheapest and most satisfactory, as they last a lifetime. These are made in several patterns in glass, with lid and rubber ring held in place by a metal screw or clip.

When we have purchased our bottles we need what is called a *steriliser* in which to heat them. Now a proper steriliser, fitted with a false bottom, thermometer, etc., is a very useful possession, but where expense must be considered, a deep boiling-pan, fish-kettle, bucket, or laundry copper will do equally well, with one or two small alterations. Whatever is used for sterilising the fruit, it should be deep enough to allow the bottles to stand upright and for them to be almost submerged in water. If the steriliser is a home-made one, the false bottom must on no account be forgotten, as otherwise the bottles are sure to crack. This is easily made by tacking together strips of wood and placing them on the bottom of the pan, to form a small platform, and thus the jars are prevented from coming into direct contact with the heated metal of the pan.

The next essential is the *thermometer*, and no fruit-bottling should be attempted without it. An ordinary dairy thermometer marked in plain English figures is the best, since no mistakes can then be made in reading it. A small hole should be cut in the lid of the steriliser, a cork fitted into this, and the thermometer let through the cork by means of boring. The thermometer should be let midway into the pan, so that it can be easily read without opening and thus cooling the contents of the steriliser.

Fruit Bottling in Water.—The first method of bottling fruit which may well be described, is the water method, and for this as for any other method the jars should first be washed, and placed side down in a vessel and covered with cold water. This should slowly be brought to the boil, and the sterilising continued for ten minutes, after which the bottles are dried and inverted. The fruit for this method, as for any other, should always be chosen when it is perfectly dry and fresh. It must not be overripe. Grading is advisable, and it is then packed carefully and tightly into the bottles, filling them right up to the top. When packing any hard fruits such as cherries or plums, one or two long pieces of blunt wood are used to reach the bottom of the bottles, and to press the fruit into position. No space is thus wasted, and the effect is an evenly packed jar. After filling the bottles, pour in clean cold water to overflowing point, put on the rubber ring and the glass lid, and then screw on the metal top loosely. After this stand the bottles on the false bottom in the steriliser, fill this with cold water until the bottles are almost submerged, put on the lid, and gradually heat till a temperature of 160° F. has been reached, which should be maintained for five minutes. Gradual heating is essential, and nearly two hours may well be taken to reach the maximum. After sterilising, remove the bottles one at a time, screwing up the tops immediately, and leave the bottles to cool. It is well to point out that hot bottles should be handled with a dry cloth, and never stood on cold metal surfaces or in draughts, otherwise they may crack.

Temperatures for Sterilising.—The following list gives the heats to which the various fruits should be sterilised. In the case of tomatoes the temperature should be maintained for fifteen minutes.

Apples	180° F.
Apricots	160° F.
Blackberries	160° F.
Black Currants	170° F.
Cherries	160° F.
Damsons	160° F.
Gooseberries	160° F.
Greengages	160° F.
Nectarines	160° F.
Peaches	160° F.
Pears	180° F.
Plums	160° F.
Raspberries	160° F.
Red Currants	160° F.
Rhubarb	160° F.
Strawberries	160° F.
Tomatoes	180° F.
White Currants	160° F.

After Management.—When the fruit has been bottled it is necessary to take care of it, and not merely to put it away on some shelf in the attic and never look at it from month to month. It is important to test the seals of the bottles to find out whether any air is being admitted. This is done by unscrewing the metal cap or by the removal of the clip, and if one can hold up the bottle by its glass lid, it is then firmly and tightly sealed, and the fruit will keep indefinitely. If not, further sterilising is advisable.

As regards the actual storage of the bottles, the best place is a dry room, away from any light, since the fruit then keeps its colour.

The opening of vacuum bottles is a problem which is sometimes difficult to solve. It may be done by forcing the glass lid up, but frequently the rubber band gets damaged in the process. A much better way is to place the bottle in a pan of tepid water and raise the temperature until it nearly boils, when the lid, if touched, will be found to be quite loose.

Bottling in Syrup.—This is undoubtedly the better way of working, since the fruit keeps its colour much better. The strength of the syrup to be used varies, the usual receipt being one pound of sugar to one pint of water. But now very good thin syrups are made by using only two to four ounces of sugar to the pint.

To make the syrup, boil the sugar and water for five minutes, stirring meanwhile, and then allow it to cool. Prepare the fruits in the usual way, packing them tightly into the bottles, and filling to overflowing with syrup. Then put on the lids, and sterilise slowly up to a temperature of 165° F., allowing as usual 1½ hours for the process. Fruit so bottled needs no more sugar, and, of course, requires little or no more cooking.

Bottling in Own Juice.—Raspberries and strawberries are very juicy fruits, and in bottling them the addition of water is liable to spoil their flavour. An excellent way, however, is to pick the berries, sprinkle them with castor sugar (or not), and pack them into bottles without adding any water at all. Put on the lids, screwing them loosely, and place them in a pan with cold water up to the necks of the bottles. As usual, heat the pan slowly to the temperature of 160° F., and by that time the fruit will have shrunk down considerably, and be covered with its own juice. Take out several bottles and fill up one from another, afterwards replacing the full bottles in the pan and re-heat for another ten minutes to 160° F. Screw the top down very tightly immediately each bottle is taken from the pan. In this way the full flavour of the fruit is retained. Blackberries, currants, and loganberries may also be bottled in this way.

Using Ordinary Jars.—If a supply of common glass jars is available, special vacuum bottles need not be purchased. To use these, scald in the ordinary way, fill them with fruit, and sterilise, afterwards sealing them with mutton fat, bladder, olive oil, or layers of paper.

The first method is easy. Have ready some of the melted fat, and cut a small piece of paper large enough to fit inside the neck of each jar; then as each jar is ready to be sealed up, dip the paper into the melted fat, and place it inside the neck of the bottle, pouring in immediately sufficient fat to form a layer half an inch deep. If not air-tight after the fat has set, pour a little more fat on, and tie down with paper before storing away.

Regarding the olive oil, heat some oil, and as each bottle is ready, pour on about three-quarters of an inch and tie with paper.

Bladder is one of the very best seals. The material is cut to the required size, soaked in tepid water, wiped dry, and as soon as each jar is ready, the bladder is stretched tightly across the neck and tied down with string.

Personally the writer has found layers of papers an excellent seal for hard fruits, but as they do not prove an efficient seal for amateur bottling, the method is not described here.

Preparation of Fruit.—Just a word before closing about preparing the fruit for bottling. Taking apples and pears first, these must be quickly peeled with a steel knife, halved or quartered, and packed tightly into bottles, previous to sterilising. To prevent the flesh turning brown, expose them to the fumes of burning sulphur for a couple of minutes in a covered jar.

Bilberries and cranberries may be prepared as for strawberries.

Blackberries and apples, if bottled together, make a delicious mixture. Wash the former, and cut the latter into thin slices, after peeling and coring. Fill the bottles with alternate layers, finally filling with cold water, and sterilise to 180° F.

Cooking cherries bottle readily. It is unnecessary to stone them, but all stalks should be removed after washing, and the fruit packed into bottles and sterilised as directed.

Damsons may be prepared as for plums.

Gooseberries should be bottled young. Top and tail them, and wash thoroughly. Pack tightly into bottles prior to sterilising.

Greengages may be bottled as described under plums.

Plums may be packed tightly or cut in halves, and each should be pricked with a needle to keep the skin from bursting badly.

Raspberries may be prepared in the way mentioned in the section on bottling fruit in own juice.

Rhubarb bottles very well, and ripe sticks should be thoroughly cleaned and cut into even lengths, to fit the bottle. Pack these very closely, afterwards proceeding in the usual way.

Strawberries should be gathered dry, and sprinkled with sugar prior to packing into bottles, as described in the section on bottling in own juice.

Tomatoes may be packed in several ways, according to the size and as to how they are to be used. Plunge the fruit into boiling water for a minute, in order to make skinning easy. Pack into jars either whole or halved, fill in the bottles with brine, allowing one teaspoonful of salt to one pint of water, and sterilise in the usual way. They may also be bottled without water, as recommended for raspberries and strawberries.—E. C.

FRUIT CANNING. — See *CANNING FRUIT.*

FRUIT CULTURE: ESPALIER MODE OF.—See *ESPALIER MODE OF FRUIT CULTURE.*

FRUIT CULTURE, HARDY: General Considerations.—Those who intend planting hardy fruit trees from November to March, should, during the fruiting season, look over their gardens and note where improvements can be made to lengthen their supply, by adding early or late sorts; there are generally too many mid-season fruits; and these, as well as useless or old worn-out trees, should be marked for destruction. Notes of desirable varieties should be prepared, taking the lists given at the end of each article as a guide. Orders should be sent in early to the nurserymen, who execute them, as far as possible, in rotation. Late customers may find certain varieties sold out, and thus a season might be lost.

Planting.—Fruit trees can, as already mentioned, be set at any period within the months named, if the weather is suitable and the land in good friable working condition. It is not desirable to purchase trees at auction sales, as they may prove second-rate varieties left over when all good trees are sold.

If possible, purchasers should visit the nurseries and see the trees in fruit with the various forms of growth and training, and give in their orders. Many growers have fruit rooms, where large collections can be seen, while doubtful varieties could be named for visitors, and advice be given to buyers on the spot.

If by delay in transit the roots are dry and shrivelled when unpacked, immerse them in water for twelve hours. Then taking the tree in the left hand, just above the collar, remove with a sharp knife all those downward thick anchor roots that can be spared, in order to prevent the roots striking too deeply into the lower soil. If the side roots are few, shorten the anchor roots to one-third, and slightly tip the other roots, always cutting from the lower side. The tree is then ready for planting.

In heavy soils trees may be set almost on the surface, but in light land they should be set in "sunk" holes, which are simply holes made deeper than usual and not completely filled in. [Hints on the actual process of planting will be found in our general article on *Planting.* —Editor.] As a rule the trees should not be set deeper than they were originally in the nursery. The upper roots should be about 3 ins. from the surface, and the lower ones not more than 18 ins. It is important that Apples on the Paradise stock and Pears on the Quince stock should be so planted that the graft junction is 2 ins. below the surface. Should the early summer be dry, give each tree a pail of water frequently. The roots of trees which are waiting to be planted should, of course, be covered up to prevent the sun and wind getting at them.

Manure.—Ordinary garden soil is quite rich enough for all new trees; but where an old tree has been removed, the soil may be worn out, and here some old decayed manure will be useful in a limited quantity; but some good fresh top spit loam is even better, as it is not advisable for the trees to make a lot of coarse growth, since that prevents fruit spurs forming, and means later on the expense and trouble of root pruning, as well as a year's check to fertility.

Pruning.—In March newly-planted trees, such as Pears on the Quince stock and Apples on Paradise stock, may be carefully pruned down. Bushes and Pyramids should have their branches and leaders shortened to six or eight eyes of the previous year's wood, taking care to keep an even balance of branches on all sides. With Espaliers, if it is desired to increase the height of the side branches (tiers), the leading central shoot is cut back 18 ins. above the top tier of branches; from this cutting three to five shoots may arise, when three should be selected to form the next tier, tying them out laterally when 18 ins. long, and leaving the central upright shoot free. When the desired height is reached, then this central shoot can be cut out. Where Espaliers are planted to form a screen to the vegetable garden, four tiers are ample, but where they are used to screen the back garden from the lawn, five or six tiers may be allowed.

Cordons will not need any pruning in March, as they are formed in the nursery, and the leader will set fruit buds in the summer. Tall standards being on free stocks—Apples, Pears, and Cherries—should have a year's growth without any pruning; but Damsons and Plums being wig-rooted, take to new soil freely, and can be pruned back to six eyes in March. For further notes on Cordons and Espaliers reference should be made to our articles on *CORDON FRUIT TREES* and *ESPALIER MODE OF FRUIT CULTURE.*

Where there are Plums as fan trees, the shoots may be pruned back to eight eyes in March, when the roots are settled and active; but trained Pears are best not pruned for a year. Where Apples are on fences as Espaliers, do not prune them the first year, neither prune Cherries on walls the first year. Wall trees are further referred to in our article on *GARDEN WALLS.*

Stocks Used.—Orchard Apple standards are worked on the Crab or free Apple stock (quite immaterial which). Standard and Espalier Pears are worked on Pear stock. Garden Pears are best upon the Quince stock, which induces early fertility. In the same way Apples on the Paradise Apple stock are best for gardens, as Bushes or Pyramids, as they soon commence to fruit.

The *Paradise* is noted for its fibrous surface rooting habit, which makes the roots respond both to the sun, warmth, and also to the rains, as well as to suitable summer surface mulching, watering or feeding, which should only be given to those trees that bear a full crop. The very best Apple stock, after years of trial in the writer's nurseries, is proved to be the true *Rivers' Broad-leaved Paradise.* He uses no other.

In small gardens tall standard forms of trees are out of place; but if they are desired they should be varieties that do not make much shade, such as *The Czar* and *Victoria Plums, Bradley's King Damson,* and *Morello Cherries.*

A pretty archway can be made by planting Cordons on each side of the path, and tying them over in arch form when they are long enough. They are beautiful objects in blossom; especially the Apples, and the fruit is again interesting to watch in development. Where Espaliers are planted they should be placed 2 ft. back from the paths, thus leaving a border for strawberries, parsley, or small vegetables such as radishes and lettuce, or even flowers. Cordons to be trained obliquely should also be set back 2 ft. from the paths.

Aspects for Wall Trees.—When facing south, Peaches and Nectarines, also late Pears, are suitable wall trees. The culture of the two former is dealt with in our article on *NECTARINES AND PEACHES: OUTDOOR CULTURE,* and that of the latter is briefly outlined in our article on *PEAR: CULTURE OF.* The north is fit for stewing Pears and late Plums, such as *Jefferson* and *Belle de Louvain*; filling in between trees with trained Currants and Gooseberries for late supply, and Morello Cherries. Walls facing west suit Apricots, *Comice,* and *Olivier des Serres* Pears, also Plums and Greengages. When the two latter are planted, they frequently make very strong growths, which if left would become fruitless. It is, therefore, a good plan after two or three years' growth, to lift them bodily in October, cut away downward roots, shorten side roots, and re-plant very firmly in the same position. No fresh soil or manure should be given, but if May is dry, water freely. They will then form fruit buds in abundance.

Walls and fences facing east take Pears and early Plums, such as *Dennistons, The Czar,* and *Oullins Gage.* Room should be found for a cordon or two of Apples, such as *Peasgood's Nonsuch,* to grow a few exhibition examples. Until the Wall trees meet, Cordons in pairs can be planted between each wall tree.

In the Northern Counties and Scotland many Apples are grown on walls. In this way *Cox's Orange Pippin* gives quite good fruit. Late keeping varieties do not complete full growth; they shrivel and become useless if not grown on walls. Apricots, early Peaches, and Nectarines often give quite good results in the north, on south walls.

Planting Distances. — Orchard Standards of the smaller compact growing kinds including such Apples as *Mr Gladstone, Worcester Pearmain*; Plums such as *The Czar, Prolific,* and *Victoria*; Pears such as *Louise Bonne of Jersey*; Cherries such as *Mayduke* and the *Morello,* can be planted 15 ft. apart. Plant stronger growers at 24–30 ft., Sweet Cherries at 36 ft., upright Cordons at 2 ft., Espaliers 15 ft., Wall Trees 15 ft., and Bush or Pyramid Trees about 10–12 ft. apart if possible. In small gardens they can be started at 6 ft.; and when they touch, every other tree can be taken out. In this way perhaps five or six years' crop can be gathered before they meet.

Low Cordons as edgings to paths are not advised, since they are seldom satisfactory, and do not pay for trouble in pruning. Two-branched (*pitchfork*) trees should have 2 ft. of space between each side branch, and three-branched (*gridiron*) trees the same. Apples and Pears are grown in this form, thus giving a great variety in a small space and adding to the interest of the garden.

All trees should be labelled with durable labels at planting time. The labels, which may be of zinc or wood, should be attached by wire to a stake, and not to the tree itself.

General Concluding Remarks.—There are several small details which may conveniently be summed up together here:—

PRICES OF FRUIT TREES.—These can be found in the nurserymen's lists. In consequence of the doubling of wages and extra cost of all materials, prices prior to 1914 are cancelled, and a fair advance is made from year to year.

POLLINATION.—In market culture this has to be carefully attended to by interplanting approved varieties for cross fertilisation; but in gardens where numerous varieties are grown, it need not trouble growers, as Nature will do the work.

SOIL CULTIVATION. — Digging among fruit trees and bush fruits should always be done with a fork; spades cut and injure the roots too much. At all times weeds and grass must be kept down by hoeing. This also acts beneficially in keeping a layer of loose soil on the surface, thus preventing rapid evaporation of moisture in hot weather. Soil stirring with either the hoe or the cultivator also lets in air and sun to warm the roots, and so helps to perfect the crops.

THINNING FRUIT.—Care should be taken to leave each fruit in its best position. Not more than two should be left together, and only one on each spur point if the tree is carrying a general crop. One to each 10 ins. of shoot is a good distance, though to some it may sound extravagant. Remove all imperfect fruits, and those which are shaded by foliage in the centre of the tree. In the case of early Apples, the removal of fruit for use at various stages saves thinning.

TOP-DRESSING AND MULCHING.—If a tree sets a full crop, a dressing of liquid manure in May will do much good. The soil can then be covered with long strawy dung, and much valuable moisture will be conserved. Good winter dressings in alternate years are kainit, lime, soot, and basic slag, leaving the rain to wash them in.

TROUBLES AND DISEASES.—These are dealt with in other parts of this work under *INSECT PESTS* and *DISEASES OF PLANTS*. A special article will be found dealing with *APPLE DISEASES*. It is well to point out here that insect pests must be attended to immediately they appear, and diseases must be for ever watched for, since otherwise great damage may be done.

Varieties of Fruits.—With thousands of varieties to select from, this is a very difficult task, having regard to the climate of various parts of the United Kingdom. The trade catalogues confuse the novice, but the present writer brings sixty-five years of active work among fruit to bear on the question, and every planter can rest assured that the named sorts which appear in each separate article on the chief fruits are of the very best. If some old favourites are wanting, it may be concluded that they are bettered by more recent varieties.—G. B.

FRUIT DISEASES.—See *APPLE DISEASES; DISEASES OF PLANTS; ORCHARD: MAKING AND MANAGEMENT OF*; and *TOMATO DISEASES*.

FRUIT: Drying of.—See *DRYING OF FRUITS AND VEGETABLES*.

FRUIT: Gathering and Storing.—See *FRUIT ROOMS AND FRUIT HOUSES*, and *GATHERING AND STORING FRUIT*.

FRUIT: Grading and Packing.

Up-to-date grading and packing ensures successful marketing, and on the latter depends the profit or loss of the fruit farm. It is useless to grow high-class fruit and then market it in a bruised and unattractive condition, as the price it obtains will then be nearly as low as the poorest samples on the market.

As a general rule, insufficient attention is paid to grading and packing in this country, with the result that imported fruit finds a readier market and fetches higher prices than home-grown produce.

Care in gathering and storing is an essential preliminary to good packing, and provided these operations have been carried out properly, the actual grading and packing is a simple matter acquired with a little practice. For gathering and storing reference should be made to our article on this matter.

Grading.—Grading as applied to fruit does not end in sorting the crop according to variations in size, but includes the following points, which are of much greater importance :—

(1) Freedom from injury or blemish.

(2) Good colour.

(3) Ripeness and high quality.

For example, moderate-sized, well-coloured, ripe fruits of good quality, if free from blemish, are properly of first or fancy grade, and are of infinitely more value than very large fruit of indifferent colour and quality.

APPLES.—Large fruit does not keep so well as the smaller ones, and the crop should therefore be graded at picking into at least three sizes, *i.e.* 3 ins. in diameter and over, 2½–3 ins. in diameter, and under 2½ ins. in diameter. At the same time all bruised or diseased specimens must be sorted out.

The operation can be carried out either by means of a grading machine, if large quantities have to be dealt with, or by hand for small quantities. In the latter case, the fruit are carefully emptied on to a special grading table, and the various grades are then placed in storing boxes or else packed for market.

Wire or wooden gauges of various sizes are sometimes used for grading, but these become unnecessary with a little practice.

PEARS.—The foregoing remarks are in the main applicable to these fruits also, but the choice varieties are much more easily bruised than apples, and therefore not only require more careful handling while gathering, grading, and packing, but must also be carefully watched for ripeness, since when once ripe they rapidly become overripe.

STONE AND SOFT FRUITS.—Grading may be practised also with advantage in the case of these, the finest specimens in all cases being sold in small packages, while the remainder are disposed of in bulk.

The price obtained, as the result of careful grading, nearly always pays handsomely for the extra labour and expense involved.

Packing.—Care in grading must be followed by care in packing if the fruit is to reach its destination with its market value unimpaired, and close adherence to the following points is essential :—

(1) Pack each grade in a separate package. No blemished fruit to be included in the first or fancy grade.

(2) Pack firmly; this prevents bruising during transit.

(3) Pack the choicest fruit in shallow packages wrapped in paper.

(4) Pack honestly as regards weight and quality. Never "top"[1] a package.

(5) Pack while the fruit is still firm and not overripe.

(6) Pack each fruit of fancy grade separately and in layers, if time permits.

Marketing Hints. — Much fruit grown in this country is marketed either in round returnable baskets, holding as the case may be a bushel, half-bushel, or peck, or else in oblong returnable hampers, called "pots" or "half-pots." These empties are usually supplied by the market salesman at a small charge for hire.

It is difficult to prevent apples and pears packed in these baskets from bruising, even though they are packed in layers. In any case the baskets should be lined with packing paper, and if available it is well worth the extra expense to line the sides with corrugated paper. A layer of woodwool or hay is placed both at the top and bottom of the fruit, the top layer being kept in place by packing sticks of hazel or some other easily bent wood. These packing sticks are placed across the top, and rammed in under the rim of the basket. Stone fruit and soft fruit are also packed in these empties, without the woodwool or hay but with the paper lining.

Cooking apples, especially for the northern British markets, are very usually forwarded in grape or sulphur barrels containing 56 or 84 lb.

Rectangular baskets known as "flats," fitted with lids, are sometimes used for high grade apples and pears, but the choicest samples of all should be packed in light wooden boxes known as "trays," holding one or two layers of fruit, each of which is completely surrounded with woodwool.

---

[1] A package is said to be "topped" when the bulk of the fruit in it is of indifferent quality, and the top layers are of better quality in order to give the purchaser a false impression of the value of the sample.

The practice of marketing carefully graded samples of apples and pears in non-returnable wooden boxes is becoming more and more general amongst those growers noted for high-class produce. There is much to be said in favour of a package of this description, as it opens up a class of trade formerly only catered for by imported fruit.

Soft Fruits.—Soft fruits for dessert purposes, and specially selected samples of stone fruits, are usually marketed in chip baskets or punnets, the former holding 4, 6, or 12 lb., and the latter ½ or 1 lb. of fruit respectively, although pecks, strikes, and half-bushels or sieves are also used. The punnets are used mainly for choice and very early fruit, and are sent to market in crates, each of which holds 32 or 48. Chip

Table of Fruit Marketing Packages

Bonnet . .	Veneer—N.R.	Stone and Soft Fruit	24 lb.	Round.
		Apples	20 lb. (approx.)	Round.
Bushel or Sieve	Wicker—R.	Apples and Pears	40 lb. (approx.)	Round.
Chip Basket .	Veneer—N.R.	Soft Fruit	4, 6, 12 lb.	Oblong.
Flat . . .	Wicker—R.	Apples and Pears	40 lb.	Rectangular.
Half-Bushel or Half-Sieve	Wicker—R.	Stone and Soft Fruit	24 lb.	Round.
		Apples and Pears	20 lb. (approx.)	Round.
Half-Pot . .	Wicker—N.R.	Stone and Soft Fruit	36 lb.	Rectangular.
		Apples and Pears	28 lb. (approx.)	Rectangular.
Peck . . .	Wicker—R.	Stone and Soft Fruit	12 lb.	Round.
Pot . . .	Wicker—R.	Stone Fruit	72 lb.	Rectangular.
		Apples and Pears	56 lb. (approx.)	Rectangular.
Punnet . .	Veneer—N.R.	Soft Fruit	1 lb. or ½ lb.	Rectangular or Round.
Standard Apple Box	Wood—N.R.	Apples and Pears	40 lb. (approx. cu. capacity)	Rectangular.
Standard Apple Half-Box	Wood—N.R.	Apples and Pears	20 lb. (approx. cu. capacity)	Rectangular.
Strike . .	Wicker—R.	Soft Fruit	12 lb.	Round.

baskets and punnets should be lined with white or blue packing paper, and the former should be covered either with paper or else cardboard lids. Dessert fruit forwarded in any of these packages should always be picked with the stalks; but jam fruit, which is marketed in tubs holding 28 or 56 lb., is picked and marketed without stalks, *i.e.* "plugged." Gooseberries and apples for jam are usually forwarded in 1 cwt. bags.

The preceding table indicates the chief packages used for fruit, the materials of which they are made, the kind of fruit for which they are used, the approximate weight of fruit they contain, and their shape. The letter R. denotes that they are returnable, and are used for several journeys, while the letters N.R. signify that they are non-returnable, and therefore used once only.

R. W.

FRUIT PESTS.—See *INSECT PESTS* and *ORCHARD: MAKING AND MANAGEMENT OF.*

FRUIT ROOMS AND FRUIT HOUSES.—When hard fruits are duly gathered in, the question of storage arises, and this is more important than many think. First let me describe "how not to do it," and then give a rational and practical procedure. One very elaborate and handsome structure I know is about 30 ft. square, built of concrete with an inner wall, leaving a 2-foot passage all round; thatched and perfectly finished in all ways. The centre has a bench with drawers below, on which show fruits are set out. There is a 3-foot walk round it. The sides to the ceiling have shelves at 3 ft. apart, set with bevelled slats, so that each fruit has a bed to itself. The slats sand-papered and finished, the floor tiled; here fruit keeps well; but the cost, £300, is altogether out of proportion to its value, as it is empty for some six months, whereas a more efficient house as described directly can be erected for £80.

In another case the room was quite correctly built, but the floor was paved with encaustic tiles, so that the place was too dry and the fruit shrivelled.

In a third case the room was placed against a brick wall, and you entered by two steps below the level; not easy for working! It was damp, clammy, and wanted proper ventilation; consequently, although the fruit kept, it lost flavour and quality. It is not at all needful or desirable to go below the surface.

An Ideal House.—Let me now describe the "Ideal Fruit House" as erected in my Allington Nurseries, where in the height of the season we can store 300 bushels of fruit, and examples of as many varieties of Apples and Pears. It is built on the flat, the corner and chief uprights being set on stone blocks (or concrete), secured by iron dowels let into the wood and stone to prevent slipping. It is then built in the usual way with quartering and stays, the roof being at an angle of forty-five degrees; at the gable apex of the roof, at each end, a hit-and-miss shutter is fixed upright, governed by a cord and pulley, to close the house in cold winds and frost. Outside this a sheet of perforated zinc is fixed to keep out wasps, etc., a 4-foot roll of 1-inch mesh wire netting is fixed to the framework, 1 ft. being sunk into the earth—this is to prevent the entrance of rats or pilferers. There are two windows on each side under the eaves, closed with shutters to exclude the light, and beneath these, 1 ft. from the level, sliding shutters are made to get air below the fruit; these are specially valuable at gathering time to disperse the sweat which the fruit gives off when first laid in. The entire area of the house and roof are then covered by ¾-inch matchboard outside, and the place is then ready for thatching; if Reed (*Carex*) can be secured it is the most lasting—next stout wheat straw. A thin board is fixed for it to stand on 6 ins. wide, with 4-inch upright boards at the corners, over and round the doors and windows forming a bay to lay the straw in upright, about 4 ins. thick; it is then kept in position by long boards 6 ins. wide laid laterally, and a little taste in placing these gives the house a finished appearance when painted green. In thatching the roof the covering should be at least 18 ins. thick and overhang at the sides, sufficiently wide enough to throw the drip well away from the side walls. Both the roof and sides should be very firmly thatched. If heather is used on the roof, the pitch should be at an angle of fifty degrees. The doors at each end should be double, the stout outside one opening outwards and the inner lighter door inwards. The doors are not panelled.

We now come to the inside arrangements. Shelves should be 2 ft. wide round the outside. Start by placing uprights 2 × 2 ins. from the ground, fastened to the rafters at about 6 ft. apart, then arrange bearers 2 × 1½ ins. to the wall; upon these lay matchboard longways, leaving half an inch between each board. These side shelves start 1 ft. from the ground at 18 ins. apart. On each place a slight cover of clean wheat straw 2 ft. long, shortways; this prevents fruit touching the wood and being flavoured by turpentine; it will last for years. The shelves are not run across the side windows.

A central table is then made about 6 ft. wide: the uprights must be 3 × 2 ins., fastened to the rafters, and the bearers 3 × 2 ins. from side to side; the lower shelf 1 ft. from the ground, and the main central table 3–4 ft. from the ground. This, which runs the entire length, is of matchboard, with ½-inch opening between each board. On this heaps of the smaller dessert fruits can be placed, and it adds interest to the place if at the entry end a named collection of the finest examples are placed so that visitors can readily inspect the fruits. This is a pleasing feature now that nearly all employers take a personal interest in fruits and their names. Above this central table another floor is made with outside upright edge boards 3 ins. wide. Here apples can be laid in bulk, provision having been made to strengthen it by extra uprights in the centre of the table. The space below the show table is used to store baskets of odd sorts in a full year. For laying up fruits see a separate article on *GATHERING AND STORING FRUIT*. The secret of success lies in keeping the natural earth floor always damp—not muddy. Always remove fruits that may decay at once. Store pears on the cool side of the house. Place the latest-keeping apples on the lower shelves. Our own house is about 60 ft. long by 16 ft. inside, and was erected by our men at a cost of £80.—G. B.

FRUIT: Saving Seed of.—See *SEED SAVING*.

FRUIT: Storing.—See *GATHERING AND STORING FRUIT*.

FRUIT TREES: Grease Banding.—See *GREASE BANDING*.

FRUIT TREES: Gumming of—See GUMMOSIS in *DISEASES OF PLANTS*

FRUIT TREES: Planting.—See *PLANTING*.

FRUIT TREES: Pruning.—See *PRUNING FRUIT TREES*.

FRUIT TREES: Spraying.

Fruit trees and bushes have a great many enemies in the shape of insect pests and fungoid diseases, and the gardener who wishes to keep his trees healthy and produce clean fruit must be prepared to deal promptly with these troubles. In most cases the only possible treatment is to spray with a suitable insecticide or fungicide. Recent years have seen great development of the science and practice of spraying. The life-histories of the various pests and diseases have been studied, and many spraying-fluids introduced as remedies and preventives. The gardener may not look with favour upon spraying, but he has come to regard it as a necessary evil. Indeed, the up-to-date grower now considers it as part of the ordinary routine of fruit culture.

Winter Spraying. — The year's campaign may be said to start with winter spraying. The chief object of this is to rid the trees of mossy growth, lichen, and loose bark, which not only impede the healthy functions of the bark, but also serve to harbour hibernating insects and their eggs. This spraying is not required every winter. The time taken for the trees to become green with mossy growth varies with the district, but in most places it is desirable to spray every two or three years. Summer spraying does not remove these growths, because washes strong enough to do so would destroy the foliage, and can only be used whilst the trees are dormant.

There are many proprietary winter washes on the market, and most of these can be relied upon. A simple home-made wash is prepared by dissolving 2½ lb. caustic soda (98 per cent. purity) in 10 gals. of water. This solution will burn the skin, so gloves should be worn, and care taken not to let the spray blow on the face. Plain limewash is also excellent. To make this, 20 lb. of the best quality freshly-burnt quicklime in lumps is slaked in a tub by just covering the lumps with water. When slaked, more water is added very gradually, stirring to a smooth cream, which is finally diluted to make 10 gals. of wash. It must be passed through a fine wire sieve or piece of sacking, and coarse nozzles used on the spraying machine or syringe.

Winter spraying can be done at any time whilst the trees are dormant, but is usually left till February, by which time insect pests are showing signs of life and are more vulnerable. The only exception is plain limewash, which is often used much later, just before the bloom buds open, in the hope of killing the aphides (greenfly) which are then hatching, or of sealing up their eggs so that they fail to hatch.

Spring and Summer Spraying.—Round about blooming-time the grower should have his trees under constant observation, for it is then that numerous enemies make their appearance, and prompt action is more than half the battle. As soon as the first tender leaves expand, aphides, apple suckers, and various caterpillars are likely to be found. We cannot spray whilst the bloom is fully open, but we can whilst it is in bud form, and again as soon as the petals have fallen. The enemies to be dealt with at this time may be roughly classified as follows:—

(1) Leaf-biting insects, such as various caterpillars.

(2) Pests which live by sucking the plant's juices, such as the different aphides or greenfly.

(3) Fungoid diseases, such as apple and pear scab, brown rot, etc.

The first class, the caterpillars, are easily killed by poisoning their food. This is done with great certainty by spraying with arsenate of lead, bought in the form of paste, and dissolved in water at the rate of 1 lb. to 25 gallons.

The second class, the greenfly, etc., are more difficult to kill. Poisoning the surface of the leaves is of no use, as they pierce to the inner tissues of the plant to obtain the juices on which they live. We must therefore use washes which act directly on the insects. The best is nicotine (95 per cent. purity), 1½ oz. to 10 gals. of water; but it is expensive. A cheaper wash may be made from 1 lb. quassia chips, 1 lb. soft soap, and 10 gals. of water. Boil the quassia with half the soap in some water for an hour, then with the rest of the soap in fresh water for another hour. Mix the two solutions, and make up to 10 gals. with water. Whatever wash is used, the great thing is to spray promptly, as, once the pests get a firm hold, particularly when curled in the leaves, spraying is almost useless. It must be repeated as required.

When both caterpillars and aphides are present at the same time, arsenate of lead may be dissolved in either of the washes just mentioned, or in any other aphis wash, using 1 lb. of the arsenate paste to 25 gals. of the diluted wash. It should not be mixed with the wash whilst in concentrated form.

There are, of course, numerous proprietary insecticides on the market, some for greenfly alone, others for caterpillars as well; and many of these do excellent work.

We now come to the third class of enemies, the fungoid diseases, such as scab and brown rot. We must *not* wait for these to appear, as treatment, to be really effective, must be preventive rather than remedial. The state of the leaves and fruit in the previous year should be the guide. If they were diseased, the affected trees should be sprayed with a fungicide three times: (1) When the bloom buds show white, but before they open; (2) as soon as the petals have fallen; (3) about three weeks later.

The most commonly used fungicide is Bordeaux Mixture, which is best bought in the form of a paste and diluted according to the maker's directions. Lime sulphur wash is probably superseding Bordeaux, being less liable to scorch the foliage. Several makers offer it in concentrated liquid form. Directions are given by the makers for diluting for "winter strength" and "summer strength," for, used strong, this is an excellent winter wash.

Hints on Spraying.—Calm, fine weather should be chosen for spraying, and care taken to reach every part of the trees. Spraying machines of many types are on sale. A knapsack sprayer is convenient for the average orchard, but in a small garden the work can be done with a good syringe, provided that it be fitted with a proper spraying-nozzle, and not the usual perforated rose of the common garden syringe.

When spraying for insects, especially aphides, a fairly coarse nozzle may be used, and the trees thoroughly and forcibly wetted. When using a fungicide, however, it is most important to apply it as a very fine mist-like spray, and never to play on the trees till the wash drips off the points of the leaves, or there is likely to be scorching.—E. M. B.

See also *SPRAYING MIXTURES AND FUNGICIDES.*

FRUIT: Weight of Bushel of.—See *WEIGHTS AND MEASURES.*

FUCHSIA (Nat. Ord. Onagraceæ). Florists' section, half-hardy shrubs, 2–3 ft. high, succeeding in a soil of good turfy loam 2 parts, and 1 part each of old manure and leaf-mould, with a sprinkling of old mortar rubble. They are propagated by seed and by cuttings, the latter being the usual method.

Culture.—Old plants that have rested over the winter, placed in a warm house in February, will soon make new growth. When the young shoots are about 2 ins. long, they can be taken off and placed in pans or pots of sandy soil, where they will form roots in a few weeks if a temperature of say 60° F. is maintained. By April they will be ready for shifting into 3- or 3½-inch pots, and at this stage should be kept near the glass to encourage sturdy growth. If intended for summer bedding, the plants will be nicely established for planting out by the end of May. Those meant for conservatory decoration should be re-potted into 6-in. pots, or even those of larger size if specimen plants are required. The leading shoot is retained its full length, but judicious pinching of the side-growths will tend to form a shapely and pyramidal bush.

Fuchsias are often used as dot plants for summer bedding, but they reach their greatest perfection grown in pots under glass, some of the species with pendulous growth making admirable subjects for hanging baskets. They all flower over a long period.

Varieties. — *Double.* — Avalanche, Ballet Girl, Duchess of York, Lena, Molesworth, Phenomenal, Sensation, and Sylvia.

Single.—Beauty of Trowbridge, Benita, Gertrude Pearson, Marinka, Mrs Marshall, Mrs Rundle, Swanley Yellow, and Titian.

About 1905 a new batch of seedlings, derived mostly from *Fuchsia triphylla*, came from the Continent. The best of these are Clio, Coralle, Eros, Fürst O. von Wernigerode, Gartenmeister Bonstadt, and Gotingen.—J. L. G.

See also *SHRUBS.*

FUCHSIAS FOR CITY GARDENS.—See *TOWN AND CITY GARDENING.*

FUEL ECONOMY.

Various suggestions have been made from time to time for the economical using up of the smaller portions of our fuel, and we are advised to mix it with peat, clay, lime, or other materials. The best idea appears to be to make a mixture of equal parts cinders, small coal, coal dust, or coke, watering the material generously meanwhile with the strongest brine. The mixture can then be shovelled into the greenhouse furnace as it is, or sugar bags can be filled with it and one of these put in as required. The last idea gives the best results, as the heat of the furnace causes the material to congeal together into a solid mass which will take many hours to burn through. Where pitch is available a tenth part of the solid after being finely crushed can be mixed with the cinders, etc., instead of watering with brine, and will give fairly satisfactory results. In colliery districts old pit props are often available cheaply for use as fuel. The ash from these is, of course, of extreme value for digging-in purposes.

FULHAM OAK (*Quercus Cerris fulhamensis*).—See *TREES.*

FULLER'S TEASEL (*Dipsacus Fullonum*).—See *DIPSACUS.*

FUMANA.—Now included in the genus *HELIANTHEMUM.*

FUMARIA (FUMITORY. Nat. Ord. Papaveraceæ).—Most of the plants known as FUMITORIES are now included in other genera such as *CORYDALIS* and *DICENTRA*, upon each of which separate articles are devoted. The species retained are hardy annuals and hardy annual climbing plants, merely requiring to be sown where they are to bloom in good garden soil. The best of the first are *F. densiflora*, *F. officinalis* (the COMMON FUMITORY), and *F. spicata*, while *F. capreolata* (Syn. *F. media* of some authorities) is the best climber. All bear pale pink flowers in July, and average 1–4 ft. in height.

FUMIGATING.

The best method of destroying insect pests, such as Black Fly, Green Fly, Red Spider, and Thrips, on fruit trees and plants of all descriptions growing under glass, is by fumigating with smoke fumes. There are various compounds for vaporising which can be bought from any nurseryman ready for use. The old way of fumigating was chiefly with paper and rags soaked in tobacco juice and afterwards dried for use, as ordinary smoking tobacco was rather expensive for such purposes. If the system of using brown paper and rags is to be continued, material of the best quality should be used, as good plants may be injured or killed by the effect of the smoke fumes of bad material. The best quality of tobacco paper can be bought from any nurseryman ready for use.

When to Fumigate. — The best time to fumigate glasshouses or frames is a dull, damp, calm evening, as then the smoke will not escape so quickly. The foliage of the plants must be thoroughly dry at the time, otherwise it is sure to get scorched. The amount of smoke to be used depends on the class of plants that are to be fumigated, and whether the foliage is tender or hardy, and also if the plants are flowering. A gardener must judge for himself from the class of plants that he is going to fumigate as to whether they are tender subjects or not, and use the amount of smoke accordingly. Never fumigate in the morning, for the sun may come out very brightly at any moment, and the plants would be destroyed or very badly scorched on account of being in a house full of smoke fumes.

Fumigators.—To fumigate with the least trouble a proper fumigator should be purchased. These are manufactured in various kinds, and it would obviously be out of place to name any one make here. A satisfactory substitute frequently used by gardeners in large establishments for tobacco paper is a 9-inch flowerpot inverted upside down, a 1-inch sand-riddle being put on the top of the pots, with a shovel of red coal cinders in the centre of the riddle. Then the tobacco paper is put over the cinders, and the whole covered with damp sphagnum moss. It is advisable to see that no flames appear, and to avoid this the moss must be kept damp by the use of a watering-can with a fine rose. The writer always finds it best, after the houses are washed out in spring and plants sponged over, to give the house a slight fumigating occasionally as a preventive to the increase of insects.

Ferneries must be fumigated very slightly, as the majority of ferns are very tender and easily scorched. On the day the house is to be fumigated refrain from damping paths or foliage. Greenhouses with plants in full flower must also be fumigated very lightly, otherwise the blooms will be spoiled, but fumigation may be as frequent as you like. A greenhouse containing but one variety of plants is, of course, much easier to fumigate than a house of mixed plants.

There are, as already mentioned, a great number of fumigators on the market at present, and they are all very good, though some are easier to use than others. The type with a glass-bottle lamp which burns methylated spirits through a round wick is the most satisfactory. There are also various compounds for vaporising obtainable in different sized bottles. The house to be fumigated will require to be measured in order to estimate the cubic feet of space. (See *Arithmetic and Gardening.*) This done, you can easily judge the quantity of the vaporising compound required, as directions are usually given on the bottle as to how much is required to fumigate each 1000 cubic feet. If carefully done, it will destroy all pests without doing the slightest injury to the most delicate foliage, flowers, or fruit.

For destroying Red Spider, Thrips, etc., on vine foliage in a large vinery, use sulphur mixed in a can of buttermilk and worked into a fine paste. Take a whitewash brush and, having the hot-water pipes well heated, close all the vinery ventilators and doors, and then paint the pipes all over with the sulphur paste. A dull, damp evening is best to paint the pipes, in order to be certain that the sun will not come out brightly after putting the sulphur on the pipes. The sulphur will not require to be taken off the pipes the following day; it can be left on, and will keep a nice sulphur fume all through the house each time the house is damped or closed.—J. C.

FUMIGATING THE SOIL.—See *Soil Fumigating.*

FUMIGATORS.—See *Fumigating.*

FUMITORIES.—These include several genera, notably *Corydalis*, *Dicentra* and *Fumaria*.

FUMITORY. — See *Corydalis* and *Fumaria*.

FUNCTIONS OF LEAVES. — See *Leaves of Plants: Their Functions.*

FUNCTIONS OF ROOTS.—See *Roots of Plants: Their Functions.*

FUNGI: Edible and Harmful.

It is to be hoped that, ere long, our acquaintance with the physical properties of Fungi will be analogous to that we now possess in regard to common fruits of the garden and orchard. As stone-fruits, for example, differ considerably in size, shape, colour, taste, and economic value, so our common fungi exhibit variations even more striking in their characteristics. Some are designated as "edible," others as "poisonous"; but these terms are comparative, and do not necessarily divide all fungi into useful and useless types. Just as some well-known fungi are more appetising than others, so are there specimens more intensely poisonous than their harmful relatives. In short, the 2000 fungi found in our woods and meadows grade themselves naturally from the most toothsome and nourishing down to the most repulsive and nauseous.

How can we distinguish the edible from the harmful? Simply by improving our knowledge of the commoner types. So-called "rule-of-thumb" methods are obsolete, useless, and may be disastrous. Formerly it was assumed that a fungus was edible if the skin peeled easily from the cap, and that any poisonous fungus—or "toadstool"—would immediately stain a silver spoon if brought into contact. These old-fashioned ideas have no foundation in fact. Indeed, it is impossible to frame any such rules for guidance in determining the nutrient qualities of fungi.

The safe-and-sound method may be more tedious, but it invariably produces the best results, and seldom brings any casualty in its train. By this method we study the best-known "edible" mushrooms first, and become thoroughly grounded in their physical aspects, such as size, colour, contour, smell, and special characteristics. Having mastered about thirty types, so as to be able to identify them at any time and anywhere, we may delve into the "harmful" variety, noting their contrasts, lurid colours, evil odours, and any other peculiar features that bar them from table patronage. Thus, from a definite acquaintance with each kind of fungus, we gain that certainty of identification which distinguishes an apple from a pear, or a Blusher from a Grisette.

In the following notes the word "pileus" is used to denote the cap or crown of the fungus supported by the stem. "Cuticle" refers to the outer skin or covering of the pileus. A "volva" is the wrapper, bag, or sheath enclosing certain fungi in their earliest stage; as growth proceeds, the volva is pierced by the cap, and its remnant is left round the base of the stem.

Herewith we give details of the more common types of edible and harmful fungi:—

EDIBLE FUNGI.

Anisette (*Clitocybe fragrans*) is, as its name implies, a fungus of fragrant odour, smelling strongly of anise. The pileus or cap is greyish-white, translucent in wet weather, but opaque when dry. It is convex, spreading to a plane, with margins thin and transparent. The stem is naked, slender, stuffed with pith, and becomes tubular. Anisette is common in fields and on the borders of woods from July to November. It often survives the withering frosts of late autumn, and may be gathered on a mild Christmas Day.

Bleeding Agaric (*Agaricus hæmorhoidarius*) is unmistakable. When crushed it exudes blood-red juice. The brownish cap is tinged with red or purple; gills are bright-red to purple; the flesh of cap and stem is white and solid; when bruised or cut this instantly becomes red. The ring round the stem is prominent and elastic. Bleeding Agaric abounds under pine trees in September and October. As an esculent it is held in high repute.

Blewit (*Tricholoma personatum*) was once very popular, and sold readily with the common Mushroom (*Agaricus campestris*). The cap is pale yellow or tannish, with margins incurved and slightly downy. Gills are crowded and greyish-white; they retain this colour permanently, never changing when cut or bruised. Stem is stout, solid, and tinged with lilac; the flesh, too, when cut, bears trace of the same tint. Blewit is common in grassy woodlands and open spaces.

Blusher (*Amanita rubescens*) is found in summer and autumn under oaks and beeches. It averages 3–6 ins. high, with a cap 2–5 ins. wide. This cap is reddish-brown, spotted with small portions of the volva, and is globose when young, but becomes nearly flat with age. The gills are white or blotched with brown. The stem, too, is whitish; but when bruised or cut the flesh "blushes" to a pale-red tint. This feature is characteristic of the fungus. The ring round the stem is large, flabby, and bears a delicate pink tinge.

Chantarelle (*Cantharellus cibarius*) appears plenteously in beech woods in early autumn. The yellowish-brown caps are discovered in groups among the short grass and mossy undergrowth. The pileus, 2 ins. wide and 1–3 ins. high, is divided into unequal lobes with a smooth, wavy surface. The gills are distinct, not crowded, and pass down the stem, which is funnel-shaped. When dry, the Chantarelle has the odour of a fresh apricot.

Dainty Bolet (*Boletus edulis*).—Of the many bolets growing in British woods and pastures in late summer, the "Dainty" is most popular. Like all other bolets, the under surface of the pileus is crowded with pores, resembling a pin-cushion well perforated. The cuticle is velvety, of a brownish-buff tint, and the pores become yellowish-green with age. The stem is thick, solid, and smooth, with a fibrous network on the upper portion; it is 2–4 ins. long. The flesh is white, and does not change colour when cut or bruised.

Great Puff-Ball (*Lycoperdon giganteum*) is identified at first sight. As an irregular white ball, 5–9 ins. in diameter, fluted towards the root, it thrives splendidly in autumn in rich meadows or on the borders of woods. At first, the skin is tough and smooth; with age it peels away and becomes watery. The fungus assumes a yellowish tint, the inner part becomes powdery, and the plant is then unfit for food.

Grisette (*Amanitopsis vaginata*) grows luxuriously in the neighbourhood of pine woods in autumn, scattered and in groups. The bell-shaped pileus, with grooved margin, varies in colour from livid white to light brown; it is smooth first, then scaly, and is covered with patches of the volva. This root-sheath is very prominent, sometimes covering one-third of the stem, which extends from 4 to 6 ins., and is attenuated towards the pileus. Gills are persistently white; they do not change to salmon, blue, or other colour.

Helvel (*Helvella crispa*) is quite distinct from other species, with crisp, wavy, white, yellowish, or flesh-coloured cap, which clings to the stem at first, then becomes free. The stem, which is tinted like the cap, is furrowed and hollow, narrowing towards the top.

Horse Mushroom (*Agaricus arvensis*) is often cooked with the common Mushroom as an agreeable mixture with stronger flavour. It ranges from 2 to 6 ins. high, with a pileus from 4 to 9 ins. wide. It is white, or tinged with yellow. The flesh is solid, white, strong-smelling, and does not turn brown when cut. The large white gills change to brownish-purple; the stem bears a loose, broad ring.

Morel (*Morchella esculenta*) enjoys an excellent reputation, and is quite unique in form and structure. In spring and early summer it appears on limy and clay soils in hedgerows and in meadows. The cap is hollow and is divided into a network of polygonal cavities with a velvety spore-shedding surface. The stem is also hollow, slightly fluted, and bulbous at the base. Morel is grey, buff, or tawny, and about 3 ins. high.

Mushroom (Common) (*Agaricus campestris*) has distinct features that are well known. Mistakes occur, and "somewhat similar" fungi are gathered instead. The Mushroom bears a white cap, ball-shaped when young, convex or plane on maturity, with portions of the ring clinging to the margin. Gills are light-pink, then reddish-brown, and ultimately brownish-black, watery, and deliquescent. When cut or bruised the white flesh changes to a dingy brown. The stem has a prominent fringe near the cap. [For cultural details see our article on *MUSHROOMS*.—EDITOR.]

Oak-Tongue (*Fistulina hepatica*), also known as BEEFSTEAK FUNGUS, grows rapidly in autumn on living elms and oaks. It extends, tongue-like, with little or no stem, from the trunk 4–18 ins., with a thickness of 2–4 ins. It is blood-red, soft, pimpled, flabby when old, and bears on its lower portion a mass of salmon-coloured pores. The taste is slightly acid and vinous.

Red-Milk Fungus (*Lactarius deliciosus*) is one of the most fragrant of esculents, abounding in fir, pine, and larch woods, where its orange-red cap may be seen well distributed. The cap is viscid, strong, and develops greenish zones on the cuticle. When cut, the pale flesh freely exudes saffron-red milk—a distinct feature of this fungus.

Shaggy Caps (*Coprinus comatus*) grows in dense clusters on waste-heaps, roadsides, and hedgerows throughout the summer and autumn. The pileus quits the ringed stem and becomes cylindrical, dingy-brown in colour, with a peeling cuticle that gives it the well-known shaggy appearance. The gills are white, changing to pink and black, eventually melting into an inky fluid. The stem—4–6 ins.—is slender, hollow, and bulbous at the base.

Urchin-of-the-Woods (*Hydnum repandum*), known also as HEDGEHOG FUNGUS, has its sporing surface composed of spines instead of gills or pores. The smooth pileus—2–4 ins.—is reddish-yellow; spines and stem have a paler tint. The spines are crowded, very brittle, conical, and emit a slight acid odour. The flesh is white, solid, and does not change colour when cut. The fungus appears in groups, in grass, and among ferns, preferably in clay soil.

HARMFUL FUNGI.

Arch-Bane (*Amanita phalloides*).—Of all British fungi this is the most deadly in its poisonous effects. Known also as DEATH CAP, it contains toxic *phalline*, which acts rapidly, and generally with fatal results. Unfortunately, it grows among edible mushrooms in open fields and woods, and may be innocently gathered with them. The cap is yellowish-green, viscid when wet, and bears small patches of volva. The gills are white, and remain so; they never turn pink or purple like the edible Mushroom. The stem is white and smooth, with a large ring-frill round its upper part and a thick, yellowish-white volva about the base. The fungus emits an unpleasant odour, especially when fully grown.

Hairy Foot (*Marasmius peronatus*) is very common in fields and meadows during the autumn. Its pale, tan-coloured pileus and thin, naked stem, with base swollen and covered with a crowd of hairy filaments, are easily recognised.

Liberty Cap (*Psilocybe semilanceata*) abounds in open grass-land and hedgerows from spring to the end of autumn. The conical pileus amply illustrates the common name of the fungus. The gills are first brown, and change to purple-black. Stem is slender, naked, and 2–4 ins. long.

Panther Cap (*Amanita pantherina*) is often mistaken for Grisette or Blusher. It differs from Grisette in having a prominent ring-fringe on the stem, and a decidedly bulbous base. In Panther Cap the gills and flesh remain white; they do not "blush" or turn pink when cut or bruised, as is the case with *Amanita rubescens*.

Scarlet Fly-Cap (*Amanita muscaria*) has such a brilliant scarlet cap, sprinkled with white patches of the volva, that it cannot be confounded with any other fungus. It is common in pine and birch woods. The gills and flesh are white; its stem is 4–6 ins., swollen at the base, with a white ring-fringe near the pileus. The fungus is very poisonous.

Sickener (*Russula emetica*) haunts open woods and meadows in late autumn. The cap is bright-red, becoming more lurid, then turning pale after maturity. The cuticle will strip. Gills and flesh are white, brittle, and often snail-eaten. The stem is 2–3 ins., and bears no ring.

Slayer (*Lactarius rufus*) is a common and dangerous fungus growing in most pine and fir woods, and often in small plantations. It is confounded with Red Milk (*L. deliciosus*), being somewhat similar in size and colour. The cap and stem are chestnut-red, the gills being slightly paler. No green zones appear on the pileus. Flesh is pale-buff, and when cut or broken exudes *white* milk—not red.

Sorceress (*Amanita mappa*).—This very poisonous fungus grows in woodlands, fields, and parklands from August to November. The cap is whitish to sulphur-yellow, and is sprinkled with loose warts. Convex at first, it becomes flat on maturity. Gills are clear-white and crowded. Stem, too, is white, and bears a loose ring-frill. The base is bulbous and covered with a loose volva. Odour is unpleasant.

Sulphur Tuft (*Hypholoma fascicularis*) will be recognised in dense clusters about decayed tree-roots and stumps. A cluster may contain hundreds of sulphur-yellow fungi bundled together in mass. Cap, gills, stem, and flesh are all yellow. Spores are purplish-black. The stem is slender, hollow, brittle, puffed at the base, and bears a slight ring. This fungus is dangerous, and emits a repellent odour.

Verdigris Fungus(*Stropharia æruginosa*) appears in damp woods, fields, and pastures during autumn, with a slimy, green pileus sprinkled with greyish-white warts. The green slime washes away, leaving a dirty-yellow tint. Gills are white, then brown, and turn with age to a purple colour. Stem is hollow and smooth above the ring; below the ring it is slimy and covered with scales. In the " button " stage the fungus is bright-green.

Woolly White Lactar (*Lactarius vellerius*) grows luxuriantly in pine and beech woods, singly and in small groups, and sometimes measures 4–9 ins. wide. The pileus is chalky-white, with a woolly cuticle spattered with soil. At first, the cap is convex, then it flattens and becomes funnel-shaped, with the margin curving under. Gills are white, broad, not crowded, and run down the thick, white, naked stem. The flesh is white and solid; when cut or broken it exudes white milk, which acquires a yellow tinge and is certainly harmful.—J. H. C.

FUNGI IMPERFECTI.—A group of fungi. See *FUNGOUS DISEASES*.

FUNGI PARASITES.—These are referred to under *FUNGOUS DISEASES*.

FUNGICIDES.—See *SPRAYING MIXTURES AND FUNGICIDES*.

FUNGOUS DISEASES.

As in the animal world the greater number of diseases are now known to be due to the action of parasites, mainly bacterial, so in the plant world diseases are also very largely of parasitic origin, mainly fungal, though there are a considerable number also of bacterial diseases. In addition there are the so-called physiological diseases, where the physiology of the plant is deranged, but not through the agency of a parasite.

Since fungi are devoid of chlorophyll (the green colouring matter in plants), none of them are able to obtain their organic food-supply from the air as can ordinary green plants. As a consequence they live either on dead organic matter, when they are called *saprophytes*, or on living organisms (plants or animals), when they are termed *parasites*. By far the larger proportion are saprophytes, which, while living on dead leaves, branches, etc., are at the same time performing the useful service of bringing about the decay of dead vegetable matter. The number of parasites is, however, very considerable, and is increased by those potential parasites which as a rule live saprophytically, but under certain conditions become parasitic and attack living tissues.

Fungous diseases cause great losses year by year to English agriculture and horticulture—the great epidemics that sweep over Canada and the United States are here more often represented by the insidious daily toll that is taken by all the more common diseases. Nevertheless it is no exaggeration to say that several millions of pounds are lost yearly, and that this loss is to a large degree preventable. A vast proportion is represented by the damage done to corn and potatoes.

The fungi can be divided into four groups as follows :—

(1) **Basidiomycetes.** — The distinguishing feature here is that the final spore is borne on a special body termed a *basidium*. The mushroom and all the toadstools belong to this group. Some of the latter are parasitic and attack trees (*e.g.* Beech Root Rot and Silver Leaf of Plum). The timber-destroying fungi, *Polyporus* and *Fomes*, likewise find a place here, and also the notorious Dry Rot fungus (*Merulius lacrymans*), which, however, confines its attack to worked or stored timber. Although not typical members, the Rusts and Smuts may also be assigned to the Basidiomycetes (see *Rust Fungi* and *Smut Fungi*).

(2) **Ascomycetes.**—This division is characterised by the fact that the final spores are borne in a sac or *ascus*. Other spores may be formed at the earlier stages apart from these sacs, and these are usually termed *conidia*. The group is a large one and contains several very destructive diseases, including Apple Canker and several other cankers, the true mildews (apple, rose, gooseberry, etc.), and many others, amongst which Cherry Leaf-Scorch, Peach Leaf-Curl, Sycamore Blotch may be taken as examples. For treatment, reference should be made to our articles on *Apple Diseases*, *Diseases of Plants*, *Rose Diseases*, etc.

(3) **Fungi Imperfecti.** — Another large group, which consists to a considerable extent of imperfect forms of one or other of the above group, and whose exact position therefore is difficult to assign. Many, however, such as most of the moulds, are quite independent. Conidial stages of the Ascomycetes are amongst some of the most general and injurious of parasites, *e.g.*, Apple Scab, Cucumber Blotch, Potato Dry Rot, Rose Blotch, and Tomato Canker. Parasitic moulds are less frequent, but the fact that Cladosporium and the ubiquitous Botrytis are ready, if suitable conditions are only present, to attack almost any plant, may be cited as examples. For treatment of these, reference should be made to the articles above mentioned.

(4) **Phycomycetes or Lower Fungi.** —These are mostly minute fungi of simple organisation, resembling in structure some of the lower algae. Like them they require much moisture, and many have motile swimming spores. Wart Disease of Potatoes, the Downy Mildews (*e.g.* Onion and

Wallflower Mildews), and the notorious Potato Blight, belong to this group.

Predisposing Causes and Treatment.—The conditions determining the intensity of a fungus attack are numerous, and interact with each other. Weather is undoubtedly the most potent, the amount of moisture and degree of temperature being as a rule the decisive factor in favouring or checking an attack by fungi or an epidemic outbreak. Of cultural factors the amount of manure has probably the greatest influence, heavy dressings of nitrogenous substances undoubtedly rendering plants more susceptible. The special methods of control are indicated under each disease dealt with in this volume, many of the less important being included in the article *DISEASES OF PLANTS*, whilst others will be found under the names of plants which they attack. With regard to general treatment, if the following rules are attended to, disease would be much less prevalent than it is: (1) avoid overcrowding; (2) never allow diseased and dead material to accumulate, but burn all rubbish at frequent intervals; (3) keep down weeds; (4) do not over-manure; (5) do not neglect to lime (quicklime or chalk); (6) tackle the disease early, as soon as it is seen; and (7) rotate the crops.—A. D. C.

FUNKIA (PLANTAIN LILY, or PLANTATION LILY. Nat. Ord. Liliaceæ).—The family takes one of its English names from the resemblance of its foliage to that of the common Plantains of our meadows and roadsides. As a rule the flowers are of small decorative value, and it is because of its ornamental leaves that the plant finds a place in our gardens. In several instances these are beautifully variegated. Although one of the Liliaceæ, the root system is more like that of an herbaceous perennial than what is usually associated with the lily tribe.

Culture.—Ordinary good garden soil and a sunny position suit Funkias very well. Propagation by division in March is easy. They may be grown in pots for conservatory or winter-garden decoration. In this case they should be wintered in a cold frame until they are brought into a cool greenhouse. Funkias thrive and do well in town gardens where few other plants will grow.

Species and Varieties.—The best sorts are :—

Funkia lancifolia.—This has pale lilac flowers and green foliage. It blooms in July or August, and grows about 10–12 ins. high. The best sub-varieties are *albo-marginata* with pale green leaves margined white, and *undulata* with waved foliage.

F. ovata.—This has lilac flowers and handsome glaucous foliage. It grows about 1 ft. high. A pleasing variety is *aurea maculata*, with golden or golden-edged leaves.

F. sieboldiana.—This has beautiful bluish-green leaves and bears pale lilac flowers in July. It grows 12–18 ins. high.

F. subcordata (CORFU LILY).—This bears white flowers in August, and grows about 1 ft. high.

J. J. & E. T. E.

FURNITURE FOR GARDENS.—See *GARDEN FURNITURE.*

FURZE.—A name applied to the genus GENISTA. See *SHRUBS.*

FURZE.—The genus ULEX. See *SHRUBS.*

G

GAGEA.—See *Yellow Star of Bethlehem.*

GAILLARDIA (Blanket Flower. Nat. Ord. Compositæ).— The **Annual Species** of this genus are very bright useful plants, carrying gaily coloured flowers on long stems which make them excellent for cutting. As, however, they dislike over-wet winters, autumn sowing outside is undesirable, though if raised from seed sown in July and August and wintered in a frame, a useful stock for planting out in April is obtained. More often they are raised by sowing in gentle heat in February or March, namely, by treating as half-hardy annuals. The best sorts are briefly described below :—

Gaillardia amblyodon (Syn. *G. scabrosa*).—This bears bright crimson flowers from June to October, and grows 2 ft. high.

G. bicolor. — See *G. pulchella* below.

G. Drummondii.—See *G. pulchella picta* below.

G. picta.—This sort, so often offered, is the variety *picta* of *G. pulchella* below.

G. pulchella (Syn. *G. bicolor*).—This species bears immense yellow flowers from June to October, and grows 2½ ft. high. Many varieties of it are now on the market. The best are: *Coccinea* (deep crimson and gold); *lorenziana* (double, red and yellow); and *picta* (Syns. *G. Drummondii* and *G. picta*), which has crimson and golden-yellow flowers. *The Bride* is a charming white hybrid.

Perennial Border Species.—These include some of the most attractive of all hardy perennials, exceedingly useful for the perennial border and for cutting as they are of exceptional beauty. There are a good number of lovely hybrids offered by the trade, and striking new sorts of even greater beauty are sure to follow. The perennial species succeed best in a warm sunny site protected from cold winds, and in exposed northern districts where snow and sharp frosts are abundant, it is well to lift and winter them in a light frame. They may be successfully raised from seed sown in the usual way for hardy perennials in the summer, and propagation by division of the roots in October or November is not a matter of much difficulty. The best time to plant them is in early March. The following is a selection of the best species and hybrids :—

Gaillardia aristata.—This popular species bears orange flowers in July and August, and grows about 2 ft. high.

G. hybrida.—The sort named thus by nurserymen bears flowers of various yellow shades from June to September, and grows about 2 ft. high. It is probably a seedling variety of *G. aristata.* Some of the best of the numerous named sorts classed as hybrids but probably further seedlings of *G. aristata*, which bloom at the same period and average 2–4 ft. high, include: *Aurora* (orange-yellow); *Gladys* (yellow); *grandiflora* (a strong-growing sort with yellow flowers); *James Kelway* (bright red); *John Stormonth* (large red flowers edged yellow); *Lady Exeter* (yellow with chocolate brown centre); *Lady Gay* (yellow marked deep red); *Lady Rolleston* (bright golden-yellow); *Mary Fergusson* (yellow and pretty rose centre); *Masterpiece* (bright crimson red and narrow ring of yellow); *Moonlight* (yellow with red zone); *Rownham Queen* (bright carmine with pale yellow ring); *Sunset* (brilliant crimson-red with yellow margin); and *William Clibran* (orange-yellow).

G. lanceolata.—This beautiful species bears yellow or orange-yellow flowers from June onwards throughout the summer, but it must not be regarded strictly as perennial. It averages $1\frac{1}{2}$ ft. in height.

GALANTHUS.—See *SNOWDROP.*

GALASIA.—Now included in the genus *SCORZONERA.*

GALATELLA.—Now included in the genus *ASTER.*

GALAX (FAIRIES' WAND. Nat. Ord. Diapensiaceæ).—A beautiful shade-loving plant for the border or rock garden, with large, round leaves becoming tinted in autumn. It is propagated by division in spring. Only one species need be troubled with :—

Galax aphylla.[1]—An evergreen creeping plant. Flowers white in long dense spikes. Soil peaty. Flowering Period, all the summer. Height, 1 ft.

GALBANUM PLANT (*Ferula galbaniflua*).—See *FERULA.*

GALEGA (GOAT'S RUE. Nat. Ord. Leguminosæ).—This is an eminently desirable, hardy herbaceous perennial in every way, provided it is given plenty of room. It is useful for the wild garden, herbaceous border, mixed border, or shrubbery border, and highly attractive with its small pea-like flowers. Established plants form large bushes, which are completely covered all over with bloom. Sprays of this are useful for cutting or for forming bouquets.

Culture.—The plant is one of the very easiest of all perennials to grow; it will succeed in town or country; in hottest sun or in light shade; in soil of sand, or in strong clay; and it is not in the least particular as to manure, provided that such nitrogenous fertilisers as Calcium Nitrate, Calcium Cyanamide, Sulphate and Nitrate of Ammonia, and Nitrate of Soda and Potash do not come its way. It may be successfully planted any time from October to March, but requires staking early and securely in the growing season. No watering or feeding is necessary save in the hottest summer. The plants may easily be propagated by seeds sown in the usual way, as described in our article on *PERENNIALS: GENERAL CULTURE OF*; they may also be increased by division of the roots in the autumn or early spring.

What to Grow.—There is no great abundance of sorts, but we recommend the following :—

Galega Hartlandii.—This, in reality a variety of *Galega officinalis*, is usually offered as a species, and is probably one of the most popular sorts. Its flowers are pale blue and white, unspeakably lovely, and produced with glorious profusion. The blooming period is a long one; often the first flowers open about the end of June, and the last one not until the end of September. The height averages 4–5 ft.

G. officinalis.—The type plant, or WILD GOAT'S RUE, is blue. The varieties of this, *alba* and *carnea plena*, are white and double pink respectively, and are more beautiful. They all flower from June onwards to the end of the summer, and range in height, according to circumstances, from $2\frac{1}{2}$ ft. to $5\frac{1}{2}$ ft.

G. orientalis.—This blue-flowered sort is not much grown. It flowers from July onwards, and is not so tall as the rest, its greatest height being 1 yd.

---

[1] The CARPENTER'S LEAF of Kew.—EDITOR.

GALEOBDOLON.—Now included in the genus *LAMIUM*.

GALEOPSIS (HEMP NETTLE. Nat. Ord. Labiatæ).—This is a genus of troublesome, hardy annual weeds which should on no account be cultivated, though they are not infrequently offered in catalogues. Several species are grown at Kew, of which perhaps the most notable is *G. Tetrahit*, the BEE NETTLE.

GALINGALE (*Cyperus longus*).—See *CYPERUS*.

GALIUM (BEDSTRAW. Nat. Ord. Rubiaceæ).—This is a genus of hardy annual and hardy perennial plants which are strong-growing weeds, and quite unsuitable for cultivation in gardens. *G. Aparine* is the weed GOOSEGRASS, described under that name in our article on *WEEDS*. A large number of species are grown at Kew. Of these we may mention *G. Cruciata*, the CROSSWORT BEDSTRAW; *G. Mollugo*, the HEDGE STRAW; and *G. verum*, the LADIES' BEDSTRAW.

GALL WEEVIL.—See under TURNIP AND CABBAGE GALL WEEVILS in *INSECT PESTS*.

GALTONIA (Nat. Ord. Liliaceæ). *Galtonia* (Syn. *Hyacinthus*) *candicans* is a fine, hardy, bulbous and August blooming plant. The pendulous bell-shaped blooms are white, and are borne on tall stems about 2–4 ft. high, according to the soil and position. They look well when associated with the scarlet *Gladiolus brenchleyensis*.

Culture.—Any ordinary soil suits the plant. The bulbs should be set in October, and slight protection given during the first winter, after which they will take care of themselves. Galtonias are splendid as pot plants for the conservatory.

J. J. & E. T. E.

GALVANISED WIRE NETTING.—See under WIRE NETTING in *GARDEN NETTING*.

GANDAVENSIS GLADIOLI. — See *GLADIOLUS: CULTURE OF*.

GANYMEDES.—Now included in the genus *NARCISSUS*.

GARDEN ACCOUNTS. — See *ACCOUNTS: GARDEN AND ALLOTMENT*.

GARDEN ALTERATIONS.

As the autumn and winter seasons approach, a good many gardeners become mildly excited in anticipation of the work before them. "Here's another chance to alter things," they say, and they look forward to a fine time, making all manner of unnecessary alterations in a vain attempt at improvement.

It is about this craze for garden alterations that I want to speak in this article, in the hope that some of those who read may have mercy on their gardens, and spare their own hands.

The craze for constant alteration is really a very foolish one. It is childish. A child, especially a little girl, can never leave things alone. It always wants to be altering things, and at length it manages to spoil them utterly, and then begins to cry. Its mother is naturally cross with it for spoiling something pretty.

And the present writer, who is privileged to visit many gardens every year, is more than cross when he sees what was a beautiful garden last year spoilt and ruined this year because of the childish craze for alteration. A child can be smacked if it is naughty enough wilfully to spoil something beautiful, but alas, the gardener or innovator of these new uglinesses, the spoiler of all that is fair and lovely, the man who is crazy on garden alterations, cannot be treated similarly. One has to grin and bear it. True, one can protest in words; but what is the use? The deed is done.

One wonders where the pleasure of these constant alterations comes in. Certainly it ought not to be a pleasure to pull to pieces what has been a lovely picture during the past summer. If it is, there is surely something radically wrong, and the gardener would be well immediately to consult his doctor. If I were his medical adviser I would certainly prescribe a dose of quinine, or some other equally nasty physic!

But, joking apart, gardeners really ought to try to leave alterations much more alone than they do. In this quickly-moving age there is little sympathy with Nature; man thinks he can do all, and that Nature can do nothing. He is very wrong, however, and he knows it in his heart, yet to prevent Nature calling him to order, and toning down his horrors with her own sweet beauty, he must for ever be rushing on, doing one thing and then another, making some new scheme to-day, and being ready to pull it to bits to-morrow, all because he fears Nature will show her hand, and make his garden what it might be—"a thing of beauty and a joy for ever."

A day of reckoning will come, though sometimes it tarries longer than most true garden lovers would wish. That gardener who has gone "the whole hog" and indulged to the full his passion or his craze for alteration, will wake up one morning with his eyes newly opened. He will look out of his window and, instead of seeing what yesterday he believed was pretty, he will see nought but the intense ugliness which now exists. He will rub his eyes as a schoolgirl does when she has woken up from a dream, and he will wonder indeed why he has been such a true fool. Dame Nature chooses her own time to open his eyes, wily old lady that she is, and instead of letting him see aright just before the time for alteration commences, she opens his eyes three months in advance.

So this gardener is punished month by month, day by day, hour by hour. He has to own the terrible results of his own work—brought on by an insane desire to alter. And his punishment is greater still. A specialist is called in, and says it will be almost impossible to make that garden lovely again.

Readers, I have painted a dark picture, I know, but I have painted it purposely. I want to see this craze for thoughtless garden alteration curbed, and curbed by every gardener. Think before you act, plan before you plant, study ere you sow, or sooner or later you will be punished.

Nature is merciless in the end. She lets you go as far as you like up to a point, and then she steps in. You realise too late what you have done, and she laughs at your chagrin.

And now for a practical conclusion to all this talk. Observation has proved that it is utterly impossible to know the results of any new plan, alteration, or scheme within the first year in which it was carried out. Man does the rough work, but Nature tones it down, and one cannot ever be certain, till at least two years have passed, as to whether one has increased or lessened the beauty of the whole.

One must think and watch and plan. Dame Nature in her many moods *must* be studied if alterations are to produce any results worth attaining. One must foster a passion for loveliness and learn the magic of colour and the glory of form, and to study Nature in her many moods.

If we don't, we shall suffer. Should there be the slightest doubt of the desirability of making any single garden alteration in the gardener's mind, it is best to leave it completely alone until such a time as we are convinced of the wisdom of undoing what has been done in the past with Nature's help.—E.

GARDEN APPLIANCES.

In purchasing garden appliances, the main things to consider are utility and the effects of their use. The garden ought to be made productive at the least cost, and with a minimum of manual labour. Economic labour-saving contrivances are therefore valuable accessories. The following appliances will be found most useful, and in their possession and use in every way helpful, giving better results and greater pleasure than by "making shift" with less handy or less effective tools:—

Barrows.—Barrows should be very strong, and are better painted, as they are often exposed to the damp, and are used for wet earth and watery manure. A good class is that made with elm tops and ash wheels. Light barrows are made of galvanised iron with wrought-iron frames and wheels. Two very useful sizes are 28 × 23 ins., and 30 × 26 ins., both larger and smaller sizes being obtainable. Another variety is an "easy tip" barrow with rounded ends, and highly useful when trenching ground or wheeling manure up into a hotbed frame.

Cultivators.—Although cultivators are by no means essential, they are decidedly useful to the gardener, for they save time, and by their construction prevent much waste of labour. For instance, single-wheel cultivators fitted with a pair of 6-inch hoes and cultivator teeth are handy. What are known as the "Planet-Junior" garden implements are useful appliances; one of the larger of these tools, including a pair of 6-inch hoes, a pair of ploughs, two pairs of cultivators, and a pair of leaf lifters, is exceedingly handy.

Garden Rollers.—Single and double cylinder rollers are sold for garden purposes, the latter being much the best for even small lawns and paths, since they admit of being turned the more easily. The handles should be well balanced and the bearings accessible for oiling. A further kind have hollow cylinders which can be weighted by filling with water. Water-ballast rollers are very good for large lawns and for cricket pitches. Weights vary; the amateur is, however, recommended to use a roller which can be drawn or pushed with comparative ease. Frequent rolling does much good to young lawn grass, and spreads the roots, especial benefit ensuing in the early spring, when the lawn requires well rolling to press down upheavals caused by worms and other creatures, and generally get it into good condition for the lawn-mower. The best time to roll is after rain, when the ground is moist. Garden walks also can only be kept in good condition by frequent rolling.

Hose Pipes.—Hose pipes should be of good rubber strengthened in various ways. The strength is denoted by the number of layers of insertion placed in the material to preserve the rubber resistance, and also to afford the proper stiffness to maintain a steady flow of water, the makers terming this as one-, two-, or three-ply. Another make of rubber hose much favoured for use on rough and uneven lawns and ground is ribbed; and a type further strengthened by the use of wire in the coils is known as armoured hose—the better qualities being tested to withstand pressure of about 250 lb. A seamless woven cotton hose, rubber lined, stands very high pressure, some of the pipes being tested to 1000 lb. pressure. Hose pipes are usually made of best grey rubber, but red rubber has been much favoured for garden purposes. The hose is supplied in lengths of 60 ft. or 120 ft., the most convenient sizes being ½ in., ⅝ in., and ¾ in. in diameter.

Hose Pipe Fittings.—Fittings for all the regular sizes of hose pipes are sold by ironmongers and sundriesmen; these include brass tubes for attachment to taps, and provision for the use of several kinds of jets and sprayers, the ends being threaded and easily inserted in the pipe, to which they may be attached by a little copper wire firmly bound. On the inlet end of the hose pipe patent tap unions are needed; by these the water supply from the ordinary taps is secured without any waste or leakage. The various jets and spreaders include sprinklers, and copper delivery nozzles for filling cans, barrels, etc.

Hose Reels.—There are two kinds of

reels on which rubber hose can be safely kept without any fear of breakage or "kinking." These are the circular reels, cheap, and easily handled or carried, and the larger reels, wound by a wheel with a handle and run on a wheeled carriage of suitable size.

Mowing Machines.—Much might be written about the different classes of lawn mowers, English and American. It would, of course, be invidious to select any one make for special mention, but the buyer is recommended to purchase a modern machine made by a well-known, old-established maker, for in these things it is the little improvements added from time to time which go towards securing a good and reliable grass-cutter. An all-round machine for lawns should have a movable grass collecting box, in order that the grass may be left lying on the lawn or not at will. The English machines have several knives upon the barrel and a strong cutting blade underneath. Some machines with fewer knives are apt to leave ridges upon the lawn, especially if it is at all uneven. Screw adjustments regulate the depth of cut, and raise or lower the back roller. Some machines are fitted with ball-bearings, which make them run very smoothly. Strength and lightness are the two greatest attributes. The two chief types are those with chain or gear drive. All machines are made in sizes varying from 8 ins. to 14 ins. cut. For small gardens, machines with 10 ins. or 12 ins. cut are most suitable. Larger machines are fitted with ropes for pulling, and there are arrangements for pony and horse draft. A mower driven by motor power will be needed for very large areas. *Lawn Sweepers* are useful on large lawns and grounds. An edge-cutter attachment which can be guided with ease is a useful addition to the machine. The bearings of both mowers and sweepers easily clog if not cleansed and well oiled, so the machines should have this little attention immediately after use.

Propagating Frames.—It is not necessary to describe here the larger kinds of frames, lean-to greenhouses, and other structures which belong more to the professional gardener than to the amateur. It is, however, essential that propagating frames and hand-lights should be used to secure the full economic benefit of gardening, and the rearing of plants for bedding out and potting. The open-roof frames with hinged lights on both sides are useful, and even the smaller sizes made from packing cases and old glass come in handy, where there is not much spare space. Cap glasses with zinc frames are also useful, the best sizes being those with diameters varying from 18 ins. to 21 ins. Oblong hand-lights 25 × 18 ins., 32 × 20 ins., and 36 × 24 ins., are recommended. A useful addition to these small frames or hand-lights is a miniature heating apparatus easily made by using a pan to hold water, some slates to cover it, and a lamp underneath in a box helping to heat it. Provided ventilation of the bottom chamber is arranged for, no harmful fumes will reach the frame above. This contrivance—most useful for striking all manner of cuttings quickly—is known as a *Propagator*.

Seed Protectors.—The small wire arches known as "seed protectors" are very useful indeed to keep off the birds when the young seeds are springing up. They should always be used for peas to preserve the plants, and secure the continuity of the row. The protectors are made in standard sizes, 36 ins. long by 6 ins. wide, and ends are also provided to prevent the birds from entering the row.

Sieves.—These are useful for providing the fine soil so necessary when sowing small seeds. Mould sieves have strong iron wire meshes and oak rims. The best have two or four meshes to the inch, the usual sizes being 14 ins. and 18 ins. in diameter. Sieves for sorting seeds and separating seed potatoes are also obtainable. Sieves for gravel and stones are made with strong wire, the meshes being ¼ in., ½ in., and ¾ in., and the sieves about 20 ins. in diameter. They are also known as *Riddles*.

Sprinklers.—There are some very profitable sprinklers on the market which can be moved about and handled quite easily; they are mostly of galvanised iron. and often on frames of cast iron, supplied with revolving arms and heads, the better ones being nickel-plated, rustless, and preferably fitted with ball-bearings. The *Garden Shower* is a circular ring with no loose parts, and is readily attached to the pipe; it is a capital and inexpensive invention for a small lawn.

Syringes.—Syringes of metal and of brass are much used in gardens and greenhouses for spraying roses and other plants; all the better kinds are of brass, but the cheaper ones are made of zinc or other metal. Some are made with fluted cylinders and are very strong. Two or more roses of different fineness are supplied with the more expensive kinds, and in some instances sprayers are also available. The ordinary types are about 16–18 ins. in length, and vary from 1¼–1½ in. in diameter. Among the favourite specialities are patent drip-preventer syringes; others have special spraying nozzles for spreading insecticides. The *Dewspray Self Container Syringe* is a capital invention, most useful to rose-growers. Another little syringe, mostly for ladies' use, is the *Baby*, a pretty syringe for destroying insect pests on roses and other plants. Syringes should be cleansed frequently, and if necessary the "tow" on the plunger renewed and tallowed to make it run easy.

Thermometers.—A thermometer of some kind is an absolute necessity to all gardeners. The common box-wood variety serves some purposes well enough, but a registering thermometer is necessary to record the fall of temperature during the night or in very cold weather. Some for green-house use are made with cast-iron frames, and those with opal scales are the more easily read as well as more lasting. Special instruments are made for testing the heat of hotbeds and frames. These are usually in a long wooden frame.

Water Barrows.—A water barrow is in many places a necessity, especially where there is no town supply of water for the hose pipe. Water barrows should be made of galvanised iron, and should have strong wrought-iron frames and riveted rims, and run freely on large wheels. The usual stock sizes hold respectively 12, 20, 30, and 40 gallons. What is called a *Garden Engine* is a water barrow to which is attached a force pump with sprayer and rose—an exceedingly handy contrivance in a fruit garden.

Watering Pots.—The ordinary watering can or pot is well known. Such cans are made of galvanised or black iron, and preferably painted; they should also be fitted with brass or copper roses. There are several sizes, varying from 3–12 pints or more for light work; heavier and stouter cans holding from 1½–4 gallons, though the last named are too heavy when filled for amateurs' use The short-spouted variety are mostly favoured, but for watering plants in greenhouses and on shelves those with long, and extra long, spouts are recommended. What is known in the trade as a lady's can, holding about 1 quart, is a useful appliance in a small conservatory. Among other varieties are strawberry water pots and the nurseryman's can with a very long spout, fitted with two or more roses to suit special work. A 6-quart can is in our opinion the most handy size.—F. W. B.

GARDEN ARCH.—See *ARBOURS AND ARCHES.*

GARDEN ARITHMETIC.—See *ARITHMETIC AND GARDENING.*

GARDEN BIRDS.—See *BIRDS AND THE GARDEN.*

GARDEN BOTANY.—See *BOTANY FOR GARDENERS.*

GARDEN CHAIRS.—See CHAIRS AND AWNINGS in *GARDEN FURNITURE.*

GARDEN CHEMICALS : List of.

Although the gardener would have to set up a druggist's store if he were to keep all the chemicals in the list below by him, he should nevertheless keep by him small quantities of the more important and useful chemicals which are marked with an asterisk. The quantity he will want will vary from an ounce or two in the case of Hellebore Powder to a hundred-weight or so of such as Nitrate of Soda. The chemicals in the list are mostly given under their true chemical names, but a few popular names such as Liver of Sulphur (Potassium Sulphide) are included. It is assumed that the reader is aware that Nitrate of Potash is the same as Potassium Nitrate, Nitrate of Lime the same as Calcium Nitrate, Nitrate of Soda the same as Sodium Nitrate, and so on. It should, however, be specially noted that "Chloride of Lime" is not Calcium Chloride but Calcium Hypochlorite, an oxidised and lower grade compound.

LIST OF GARDEN CHEMICALS.

Acid Sodium Phosphate.
Alum.
Aluminium Metal.
Aluminium Sulphate.
Ammonia (Liquid).
Ammonium Carbonate.
Ammonium Chloride.
Ammonium Chromate.
Ammonium Hydroxide.
Ammonium Molybdate.
*Ammonium Nitrate.
Ammonium Phosphate.
*Ammonium Sulphate.
Ammonium Sulpho-cyanide.
Aqua Fortis (Nitric Acid).
Arsenic (*White*).
Barium Carbonate.
Barium Chloride.
Basic Slag.
Bees' Wax.
Benzine.
Beta Naphthol.
Blue Stone. (See Copper Sulphate.)
Bone Ash (*Black*).
Bone Ash (*Purified*).
Bones, Degreased.
Boracic Acid.
Borax.
*Bordeaux Mixture and Paste.
*Burgundy Mixture.
Calcite.
Calcium Carbide ("Carbide").
Calcium Carbonate (Chalk).
Calcium Chloride.
*Calcium Cyanamide (Nitrolim).
Calcium Fluoride.
*Calcium Hydroxide (Slaked Lime).
*Calcium Hypochlorite (Chloride of Lime).
Calcium Mono-orthophosphate.
Calcium Di-orthophosphate.
Calcium Tri-orthophosphate.
*Calcium Oxide (Quicklime).
Calcium Sulphate (Gypsum).
Calcium Sulphide.
Carbide. (See Calcium Carbide.)
Carbolic Acid.
Carbon bi-sulphide.
Carborundum.
*Caustic Alkali Washes.
Caustic Paraffin Emulsion.
Caustic Potash.
Caustic Soda.
Chalk (*Precipitated*).
Charcoal (*Animal* and *Wood*).
Chile Saltpetre (Sodium Nitrate).
*Chloride of Lime (Calcium Hypochlorite).
Cobalt Nitrate.
*Condy's Fluid.
Copper Aceto-arsenite.
Copper Arsenate.
Copper Carbonate.
Copper Nitrate.
*Copper Sulphate (Blue Stone).
Copperas. (See Iron Sulphate.)
Corrosive Sublimate. (See Mercury Chloride.)
*Creosote.
Cupram.
Emery and Emery Paper.
Epsom Salts. (See Magnesium Sulphate.)
Ferric Chloride.
Ferricyanide. (See Potassium Ferricyanide.)
Ferrocyanide. (See Potassium Ferrocyanide.)
Ferrous Ammonium Sulphate. (See Iron Ammonium Sulphate.)
Ferrous Sulphate. (See Iron Sulphate.)
Fluor Spar.
Formaldehyde.
Formaline (similar to Formaldehyde).
Freezing Salt.
Gaslime.
Green Vitriol. (See Iron Sulphate.)
Guanos (Various).
Gunpowder (for squib-making in the destruction of Wasps' nests).
Gypsum. (See Calcium Sulphate.)
*Hellebore Powder.
*Hydrochloric Acid (Spirits of Salt).
Hydrocyanic Acid.
Hydrofluoric Acid (too dangerous to keep).
Hydrofluorsilicic Acid.
Iodine.
Iron Ammonium Sulphate.
Iron Sulphate (Green Vitriol).
*Kainit.
*Lead Arsenate.
Lead Carbonate.
Lead Nitrate.
Lead Oxide (especially the kind known as Red Lead).
Lead Sulphate.
*Lime. (See article on *LIME*.)
Lime Sulphur Wash.
Limestone (crushed grit or powdered).
Linseed Oil.
Litharge (Lead Oxide).
*Liver of Sulphur (Potassium Sulphide).
Magnesium Ammonium Phosphate.
Magnesium Carbonate.
Magnesium Chloride.
Magnesium Sulphate (Epsom Salts).
Mercury Chloride.
Mercury Sulphide.
Methyl Alcohol.
*Methylated Spirits.
Microcosmic Salt.
Muriate of Potash (Potassium Chloride).

Muriatic Acid (same as Hydrochloric Acid).
*Naphthalene.
*Naphthalene-Paraffin Emulsion.
*Nicotine Washes.
Nitrate of Lime. (See Calcium Nitrate.)
Nitre (same as Potassium Nitrate).
Nitric Acid (Aqua Fortis).
*Nitrolim (same as Calcium Cyanamide).
Nitro-sulphuric Acid.
Orthophosphoric Acid.
Oxalic Acid.
*Paraffin Emulsion.
Paraffin and Naphthalene Emulsion.
*Paraffin Oil.
Paranaph (same as Paraffin and Naphthalene Emulsion).
*Paris Green.
Pearl Ash.
Permanganate. (See Potassium Permanganate.)
Petrol or Petroleum.
Phosphoric Acid.
Plaster of Paris.
Potash. (See Potassium Carbonate.)
Potassium Carbonate.
Potassium Chlorate.
*Potassium Chloride.
Potassium Chromate.
Potassium Cyanide.
Potassium Dichromate.
Potassium Ferricyanide.
Potassium Ferrocyanide.
*Potassium Hydroxide (Caustic Potash).
Potassium Monosulphide.
Potassium Muriate (same as Potassium Chloride).
*Potassium Nitrate (Saltpetre or Nitre).
*Potassium Permanganate.
Potassium Sulphate.
*Potassium Sulphide (Liver of Sulphur).
Prussic Acid (same as Hydrocyanic Acid).
Pyrethrum Powder.
Quassia (not, strictly speaking, a chemical).
*Quicklime (Calcium Oxide).
*Red Lead.
*Salt, Common Kitchen (same as Sodium Chloride).
*Saltpetre (same as Potassium Nitrate).
*Saltpetre, Chile (same as Sodium Nitrate).
Shellac.
Silver Nitrate.
Soda Emulsion.
Soda Lime.
*Soda, Washing (same as Sodium Carbonate).
Sodium Ammonium Hydrogen Phosphate.
*Sodium Carbonate (Washing Soda).
*Sodium Chloride (Common Salt).
*Sodium Hydroxide (Caustic Soda).
*Sodium Nitrate (Chile Saltpetre).
Sodium Orthophosphate.
Sodium Phosphates.
Sodium Pyrophosphate.
Sodium Silicate.
Sodium Sulphate.
Sodium Sulphide.
Soft Soap.
*Soot.
*Spirits of Salt (same as Hydrochloric Acid).
Sulphur (*Black*).
*Sulphur (*Flour of*).
*Sulphur (*Liver of*).
Sulphuric Acid.
Sulphuric Ether.
Sulphurous Acid.
*Superphosphate.
Thomas' Slag. (See Basic Slag.)
Tobacco Powder.
*Turpentine.
*Vaseline.
Vitriol, Oil of (same as Sulphuric Acid).
*Washing Soda (same as Sodium Carbonate).
*White Lead.
*Whiting.
Zinc Carbonate.
Zinc Sulphate.—E.

GARDEN CHEMISTRY.—See *CHEMISTRY FOR GARDENERS.*

GARDEN CRESS.—See *LEPIDIUM*, also under MUSTARD AND CRESS in *SALAD PLANTS.*

GARDEN DESIGN ON MODERN LINES.—Gardens vary in extent from a few rods to many acres of ground, and are infinitely varied in outline and circumstance. No single book can therefore deal with every problem connected with the subject of garden arrangement and design.

It may be possible, however, to summarise in a short article a few leading ideas serviceable to the amateur who is interested in planning what may be described as an "average" garden.

Zeal without discretion accounts for a good deal of the disorder into which many gardens drift. When no definite idea has prevailed, a day is sure to arrive when it is found desirable to pull things together into one coherent scheme. Unfortunately it is often too late then, unless one has the courage to sacrifice some treasured possessions.

When a practised designer begins to plan a garden the first thing he does is to collect and tabulate his data—even though he may do so unconsciously. He next establishes in his mind those matters which he considers essential to the case. He then allows his imagination to play round what is desirable, and finally he adjusts to the hard facts of practicability what he would wish to do if he had a free hand.

With regard to data—the first thing required is a plan of the site showing things exactly as they are. The plan should be to a conveniently large scale, and if the contour of the ground is uneven, levels should be taken and figured on the plan. The ground plan of the house should be accurately indicated with all outbuildings. The positions of all doors and of the windows of important living-rooms must be marked on the house plan.

The site is next carefully examined, and the most extensive and picturesque vistas as seen from the house, are noted ; existing trees and other features worth preserving or offering a possible nucleus for characteristic development should be carefully observed—a wet ditch may be such an instance. Consideration must be given to positions exposed to cold or rough winds. Undesirable objects, either on the site or beyond the boundary, may require screening—or there may be some attractive vista or feature outside the garden worth incorporating into a view.

The ground must be carefully studied for the purpose of ascertaining the most sunny, shady, or unfavourable spots, the need for drainage, the nature of the soil and subsoil, the resources of the site (stone or gravel, for instance, may be valuable, and excavation may give an opportunity for an interesting sunk garden or diversity of level), the kinds of trees and shrubs best suited to the locality and soil, and other similar matters.

All the foregoing points will be kept at the back of one's mind in working out the scheme of the garden. In considering necessities I place first the absolute importance of planning a garden within the capacity of the owner, not only in respect of original expenditure, but in the cost of maintenance. It is fatal to efficiency to overburden the garden staff with work beyond their power. It results in certain disappointment to the owner and disheartens the men. Essentials vary according to circumstances, but a few requirements are common to every garden.

A point of real importance is the matter of access to the front door. Bad judgment in the arrangement of carriage drives spoils the best possibilities of many gardens. The manner of approach is the first thing to consider in any garden plan. This road or path is used more than any other in the garden, and deserves to be made as attractive as possible—not merely walled off by dull high hedges. A carriage drive should not be unnecessarily long, or useful garden ground may be wasted. A forecourt should not be made at all if it cannot be sufficiently large for its purpose. For a small house where carriage or car are rarely used it is better to have simply a wide path to the front door. Separate and private access to the back door is, of course, necessary, and the arrangements for connection with stable or garage must be as convenient as possible.

With regard to garden paths which are bare necessities, one would first consider those required for circulation round the house, if the word may be used in connection with paths that should usually be straight and parallel to the main walls of the building. Broad terrace paths on the principal garden front or fronts are of chief importance. They form the bases of the whole garden plan. A simple principle is to provide one continuous walk round the gardens affording the longest and most complete tour of inspection of all the chief features of attraction. Of course, additional paths are generally wanted, but gravel paths should be reduced to a minimum—grass walks being much more pleasing. Stone paving or brick paths (placed on edge) are attractive. A novice generally enjoys working out ingenious designs for a formal garden patterned in gravel. It is a phase through which most garden designers pass. Sooner or later experience and observation invariably bring home the truth that simplicity of outline and directness of plan afford the best results when one has to rely upon a natural medium such as plants for picture effects.

Referring again to what is necessary, dry access must, of course, be given to the vegetable garden from the kitchen.

A kitchen garden is now essential so far as space permits. It will need a favourable but inconspicuous position. The size must be determined by the probable needs of the household and the proportions generally of the whole garden. The kitchen garden may be intersected by flower borders or a pergola and be thus brought into relation with the pleasure garden.

If the area does not suffice for planting an orchard, fruit trees may be placed on the lawn or grass for decorative effect. The bloom of apple, plum, or cherry trees is quite as beautiful as that of kindred trees grown only for their flowers.

If glass is required, a really suitable position should be reserved. A lean-to greenhouse should face due south; a span-roof structure should run north and south if possible. A greenhouse or conservatory is never a picturesque object in a pleasure garden, and rarely so as an adjunct to a house.

In certain parts of the garden planting for the purpose of shelter and screening may rank as necessities. It will assist in shaping the framework of a design if such positions and the situation of the other details already referred to are provisionally marked on the plan.

Important details often overlooked until the need arises are positions for potting shed, tool houses, etc., and rubbish heap. Every well-ordered garden *must* have a convenient place for waste purposes, kept, of course, well out of sight.

We now come to the crux of the affair—the question of design.

Still following the matter on lines of common sense, one will first consider what features are particularly desired. These may include all or any of the following: croquet, tennis, or other playing lawns; Rose Garden; Gardens for annuals or other favourite flowers, such as Tulips, Iris, or Lilies; Rock, Water, or Bog Gardens; herbaceous borders; garden house; Pergola, or special sections for climbing plants; Specimen shrubs; and many other features which may be fancied.

The earlier study of the site may go far towards dictating or suggesting the best situation for any one or other of the details named, and the skeleton of the scheme is advanced a stage by again indicating provisionally the area required and the positions (positions, not yet the design) upon the plan.

The decisions already arrived at are, however, merely so many dry bones, which can only be brought to life by the quickening power of imagination. This is a power which may be stimulated, but cannot be conveyed from one person to another. No one can be taught how to design. The would-be designer must teach himself by applying lessons learned patiently from the best examples and expressing them by the force and fertility of his own imagination.

The chief aim in modern garden arrangement is pictorial effect combined with interest in detail. Fortunately these are both best served by designs which are simple in principle. The first objective in a picture is good composition, and the elementary principle of good composition is the achievement of what is called unity—that is the predominance of one object or point of importance to which all other parts and details are subordinate. The determination of this object or point is the first step towards making a design of the whole or of any part of the garden. Every subordinate garden complete in itself must have a similar focal point or chief object of interest.

It will probably be agreed that the most desirable gardens are those which contain the largest possible number of charming pictures. These pictures should be arranged to be seen from the most important points on the house fronts, and at changes of axis in the garden.

Intricate elaboration in design is far from necessary for pictorial effect. It is in fact confusing and detrimental unless carried out by a master hand. The beauty of a garden is determined by what one sees in elevation, not by the excellence of a design as it appears on paper. A garden is made beautiful partly by the beauty of the things that are planted in it, but chiefly in consequence of the positions they occupy in relation to each other.

Any garden which is planned sensibly to the ordinary mind, logically in so far that a reasonable justification can be made for everything that is done, and unaffectedly in harmony with the purpose and pretensions of the house, is well designed. Such a garden can generally be made charming by a person who has a good eye for a picture, a sound knowledge of the resources of horticulture, and a feeling for nature.—E. W.

[The article just given is full of sound advice, and should be useful to any gardeners whether young or old. So much nonsense has been talked about Garden Design that it is a real relief to read the remarks of one who is such a sympathetic expert in his subject. The three possessions summed up in the last sentence need special comment.

Gardeners should cultivate an eye for a picture. They should by study be able to tell more or less at a glance what is so "radically wrong" with any badly designed gardens they may enter. This will only come with study, but it is worth the study, and an eye for a picture will largely prevent failure or disappointment in garden design.

Secondly, a sound knowledge of the resources of horticulture is absolutely essential to be a successful garden designer. We must know the greatest and the smallest possibilities of every plant or tree we propose to use. If not, we shall be riding for a fall. Such knowledge can only be acquired by a good deal of patient study and by constant observation.

Thirdly, sympathy with or a feeling for nature is essential. Feeling of any kind in these twentieth-century days is, if shown, mocked at or considered childish, and we Englishmen are becoming experts at curbing every atom of feeling that there may be in us. But why? Feeling is not given us for the purpose of being for ever held back, for ever curbed or thrust aside. We are all of us human beings and not machines. But if we are continually curbing our feelings we can soon kill them, and then we are merely human machines. To revert to our point that a feeling for nature is essential to the successful garden designer, we may say that it is the fashion to do one's best to kill this. A gardener, instead of cultivating this beautiful human passion, cultivates a stern matter-of-fact manner instead. He leaves it to his employers, schoolgirls, or grown-up ladies to gasp, "Oh, how lovely!" when they see a beautiful flower or a sheet of bloom in garden or wood. But let him not ban feelings, for if he has not a feeling for Nature in all her moods he cannot hope to use her resources successfully for his garden design.

Lastly, the gardener should surely keep his eyes open wherever he goes. He should deign to study other gardens, instead of despising them, or deciding, as he so often does, without the slightest reason, that "they are not so good as ours, and so are not worth troubling about." He should view every garden he may have a chance to enter with an open mind, and analyse it critically in his mind. He will then see not only its failures, but its many successes—little beauty spots of which he had no idea will seem to spring up and dance before his eyes. It is very likely that he will learn something of great use to him when it comes to modifying the design of his own garden, which up to now he considered faultless. —EDITOR.]

GARDEN DESIGN ON OLD-FASHIONED LINES.—When considering the older gardens in relation to those of quite modern times we note that, except in special cases, they were much smaller in size, and for the most part closely walled or fenced. In the early Middle Ages the largest gardens were those attached to the religious houses, almost entirely for food production, with a few flowers only for ceremonial decoration. With few exceptions it is not till Tudor times that we know of gardens purely for pleasure, but then, with the new security of the country and the building of noble houses of the palatial, and many more of the manorial classes, the need was felt for gardens for delight, and every house must have its suitable accompaniment of flowers and blossoming shrubs and trees. The earlier gardens were nearly always of square form, and enclosed by wall or moat, for though the actual need of means of defence no longer existed, the feeling of a desire for safety and seclusion remained, and deer and wolves were still at large. Whether the house was large or small, it was usual to have a quiet forecourt between it and the road, with a paved path to the door passing between plots of grass to right and left, but without any special display of flowers; and perhaps no pleasanter way of access to a house has ever been devised. A large place would sometimes have two such forecourts with a handsome gatehouse between the two. The flower garden was on the farther side of the house, with a wide terrace running close to the building and overlooking the parterre. It was usual for this garden to be on a level a few feet lower than that of the house, with either a central flight of steps, or steps down at each end of the terrace. Later, in Stuart times, came ornaments in stone, marble, and lead. The lines of the garden were kept straight and orderly, and those gardens that remain or that have been designed with the same intention have a kind of homely dignity that accords well with our national character and our English landscape, as also with the houses to which they belong. Such gardens are specially suitable to the dignified style of building of the eighteenth century, when they had settled down into a character that may be described as having the qualities of sanity, serenity, and sobriety. For all good gardening has its foundation in common sense. The old designer accepted the conditions of the place, and moulded them to the most reasonable form; he avoided anything of strain or affectation, and drew no line that was not to some good purpose or definite intention. It is true that, when our gardening began in Tudor times, various accessories were employed that we should now consider frivolous and unworthy, such as gilded bird-cages and hanging objects of coloured glass to flash in the light. But as our gardening grew to more definite form these were cast aside, and our English garden went on its own quiet way, avoiding also in later times the lavish over-adornment of the French, and the petty intricacies of the Dutch styles. It would be well in these days, when gardening possibilities are so vast and the designer may be tempted to run wild, that he should restrain himself and strive to regain the older simplicity and charm, remembering that the first purpose of a garden is to be a place of quiet beauty such as will give delight to the eye and repose and refreshment to the mind.—G. J.

GARDEN DIARY: THE KEEPING OF A.—One of the very biggest mistakes the gardener can make is not to keep any record of his work in the form of a Garden Diary. The practical value of such a diary, if properly arranged, is very great indeed, and by means of its Index, or its Sowing Table, the gardener can turn up anything he happens to want in the course of a minute or two. The diary is a great aid to successful gardening—greater than can easily be explained in a few words. An example of its use will be found below:—

March 15th.—Sow seed of Godetia The Bride.

April 3rd.—Sow more seed of Godetia The Bride.

April 15th.—Those plants of Godetia The Bride sown March 15th look small and spindly. Probably I sowed them too early.

April 21st.—Godetias sown March 15th look very poor and spindly, but those sown April 3rd very strong and healthy.

May 30th.—Pretty certain I sowed that Godetia The Bride too early (March 15th), for that sown April 3rd is far better.

June 15th.—Yes, I did sow that Godetia too soon, for the plants sown on April 3rd opened their first flowers to-day.

June 30th.—Remark on June 15th about Godetia The Bride sown on March 15th confirmed to-day, when it flowered for the first time—a fortnight *later* than that sown on April 3rd, and even now the flowers are very poor, hardly worth gathering in fact.

An example of the Sowing Table is now given :—

PART OF SOWING TABLE, 1919.

NAME OF CROP.	WHEN SOWN.	REMARKS LATER AND DURING SEASON.
Artichoke, Jerusalem	March 20th	Sown too late. Another gardener put his in on February 20th, and got much better crop.
Carrots . . .	March 3rd	Splendid crop.
Parsnips . . .	March 30th	Too late. Must sow at least a month earlier next year.
Salsafy . . .	March 15th	Good crop.
Swede Turnips .	April 3rd	Poor crop. Am told they should have been sown early in February, hence probably my failure.

him. These should be jotted down in the Garden Diary and looked through occasionally. This tends to make the gardening more successful. About the Notes on Plants, the gardener very often will see a plant he would like to grow, in some friend's garden. If he takes down its name, height, colour, and period of flowering in his Garden Diary, he will be able to get that plant at a nursery in the autumn.

The examples just given will show the practical value of such a Garden Diary. Besides recording failures and successes, and being used as a means for deducing the reasons for such, it forms a very useful reminder of what work should be done at what time. Nobody's memory is infallible, and indeed, such important operations as the sowing and planting of seeds at the proper time should not be trusted to the memory. By experiment the gardener finds out at what time it is best to do certain things in his district, but when once he has found them he ought to record them, for they are easily forgotten.

There are two features which should not be omitted from the Garden Diary, and these are pages for Items of Interest and pages for Notes on Plants. The gardener often reads in the papers little tips which may be very useful to

Indexing.—This appears to be the only difficulty in the keeping of a satisfactory Garden Diary, but it is essential, since without an Index nothing can be found easily. We consider the best plan is first of all to page the book, and reserve a twentieth part of its total number of pages for Index at the end. Cut these and mark them A B C and so on, on the edges, as is done in the case of "Where is it?" books, and construct your Index as you go along. If your diary is in 4to. pages (and this is most desirable), each page will carry two columns of Index. When you write up your diary and put dates of sowing artichokes, put the word "Artichoke" and its page number under "A" in your Index. Likewise, when you write Notes of Interest or Notes on Plants, put the headings down in your Index as you go along. If this is done the work is simple, but if a diary has to be indexed at the end of the year, the task is a mammoth one.—E. T. E.

GARDEN EDGINGS.

Hundreds of gardens are utterly spoilt owing to the supreme ugliness of the edgings used for separating the borders from the pathways. And it is time indeed that a protest was made against some of the more striking productions known as "Edging Tiles." Three of the worst of these types are pictured at Figs. 1–3, and it is an astonishment to us that anyone artistic or inartistic can tolerate them as an edging to flower borders for a minute. Ugly, highly-coloured slabs of earthenware they frequently are, suitable enough for foreign gardens, but entirely out of place in homely English gardens where true beauty of form and flower should be the first considerations.

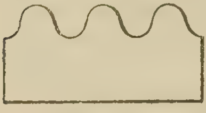


FIG. 1.

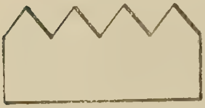


FIG. 2.

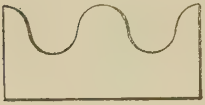


FIG. 3.

The edging for the garden should be as plain and as unobtrusive as possible. This can be managed by using the plain stone slab shown at Fig. 4. This is about 1 ft. deep and about 15 ins. in length. The slabs can easily be obtained in most districts, for they are abundant in many beds of "laminated" sandstone or limestone.

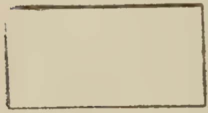


FIG. 4.

If the borders are made to be absolutely permanent features of the garden, the question of putting down the edgings in a permanent manner becomes imperative. Edging stones of the kind just described are apt to sink, and it is then a difficult matter to raise them satisfactorily. If, however, the border is only temporary and further alterations contemplated in three or four years' time, it is quite sufficient to beat the soil in the edging trench firmly and set them in this, ramming material as hard as possible on both sides of them.

Permanent edgings must be laid differently. Fig. 5 shows the best way of laying them. A trench is got out and two lines of bricks laid down along it, as represented by AA and BB. These lines are left 3 ins. apart. The cavity between them is filled up with concrete, and should the soil not be solid the bricks themselves should be laid on a 3-inch bed of concrete. The edging stone is then inserted between the top two bricks, and made firm with cement.

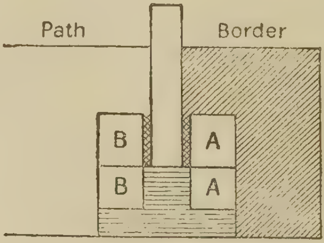


FIG. 5.

An alternative method is shown at Fig. 6. A trench is got out, as before, and a 3-inch bed of concrete laid down. Before this has completely hardened, the edging stones are put in and set in more concrete.

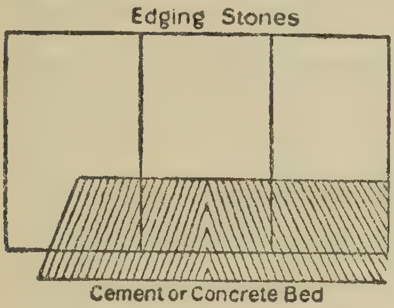


FIG. 6.

The soil on both sides is beaten as hard as possible.

Where the family are fond of dwarf rock garden plants as edgings to the perennial border, no trimmed stone should be used to separate this from the path. Instead, roughly shaped boulders and irregular rock-work stone should be used, as is pictured in Fig. 7, for the border side, and a plain edging to separate the other side of the path from the rose garden. The plants can trail over the "Rock Edging" as it is called, and make the border look most beautifully natural. In this case the stones will not need to be set in concrete if they are sufficiently large and heavy. Edging stones of any kind should never protrude more than 4–5 ins. out of the path or border. If they do, they give the garden an appearance too ugly to be described. See also the article on *GARDEN PATHS*. For the plants to use for edging, see the article on *EDGING: HARDY PLANTS FOR*.—E.

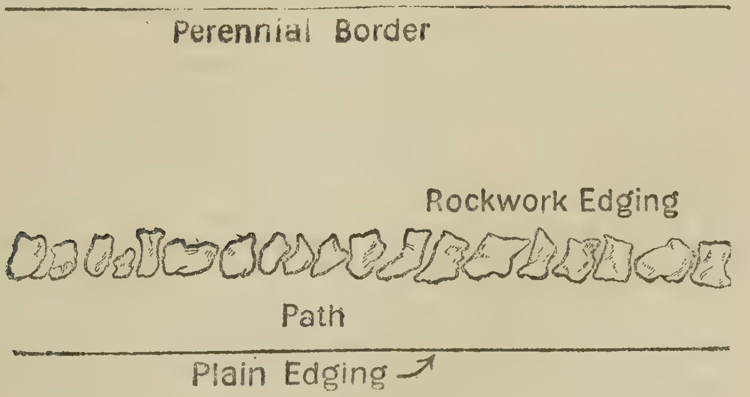


FIG. 7.

GARDEN ENEMIES.

By garden enemies we mean what are generally known as the animal enemies of the gardener. Another contributor is dealing with garden pests, namely, with the insect side of the subject.

Probably the enemies of first importance to the gardener are:—

Stray Cats and Dogs.—These, as is well known, can spoil a beautiful border in half an hour by tearing it up or rolling on it. There are one or two well-known methods of dealing with them which must be mentioned. The first of them is to half-cut some tempting pieces of meat and put a big dash of cayenne pepper in them, leaving these pieces about the borders where the creatures come. They soon learn a lesson not to visit the garden again, after tasting one of these tit-bits. One of our esteemed friends tells us that he sinks bottles in his borders and puts a little strong ammonia into them. One good sniff is enough to send these animals bounding over into the next garden! It is not legal in most districts to put poison down, but if the animals can be caught and chastised, they will probably return to their own masters and mistresses in a different frame of mind.

Mice.—These are often very troublesome, both in the garden and in the gardener's storehouse. The wood and spring metal traps are the best means of catching them, and after they have been in use they should be scalded and scrubbed, or they will cease to be effective. The traps should be put about the borders and amongst the foliage, as well as on the potting-shed floor. They should be examined daily.

Moles.—These pests are terribly troublesome in the garden. We have seen glorious gardens on light, sandy land completely spoilt by moles burrowing in them and casting up mounds. It is little use setting mole traps in the smaller runs made by these pests, for the chances are ten against one that not a single mole will be caught. In the case of the main runs the matter is very different. Provided that the traps are set firmly and well concealed, also as long as they are not touched with the naked hands, there is no reason at all why a mole a day should not be caught. A better plan still is to follow the main runs to the "earth," and dig this out and destroy the pests. Poisoned worms are not much good.

Rats.—These are great pests, though, fortunately, not over-abundant. Rat poison is good, but must be of a kind which is harmless to human beings and other animals, otherwise in most districts the authorities will not allow it to be put down. The big wire rat-traps are effective but unsightly, and should only be used in the worst cases.

Garden Robbers may also be considered the direst garden enemies, but as they are a different kind of enemy to any of those named above, they are treated of in a separate article of that name.—E. T. E.

GARDEN ENGINE.—See under WATER BARROWS in *GARDEN APPLIANCES.*

GARDEN EXPERIMENTS.

In a recently published book[1] the writer spoke briefly on the subject of "Experiment in Gardening" in one of the concluding chapters, and as it seems that the Dictionary would be incomplete without a little essay on this subject he takes up his pen to write again on a topic in which he has always had great interest.

British gardeners as a general rule seem terribly afraid of experimenting. Some of them undoubtedly think it is pure waste of time, but for the most part it is simply ignorance of its great and frequently profound value which keeps them from the work. This is not the case with gardeners in France or in many other countries; most gardeners of other nations are very quick to realise the great value of experiments, and make them accordingly. In England, alas, we depend on the Royal Horticultural Society, and on other similar organisations, for carrying on this work; they are already overburdened with it, and many promising side-lines have to be left un-investigated or the work would never end. This state of things would never arise if British gardeners would carry out experiments for themselves, instead of putting them on to the organisations just referred to.

---

[1] *Jottings of a Gentleman Gardener.*

British gardeners have got the reputation of being behindhand in respect of experimental work, and this reputation, though well deserved, is not a pleasing one. It will, of course, take some years to live down, but the sooner British gardeners wake up and realise the need for, and the intense value of experimental work, then the sooner this ugly reputation will disappear.

There are plenty of subjects awaiting the experimenter. There are, for example, diseases for which there is no real cure known, as in the case of Wart Disease of Potatoes. If a number of practical gardeners would give attention to this matter, a cure would probably be found during the next few years, whereas it might take a single experimenter at one of the gardening colleges, for instance, a much longer period to solve the problem, for he would be working alone. The comparing of notes is of great importance, and this is best done in the correspondence columns of gardening papers.

Besides trying to obtain cures for diseases by experimenting with various mixtures or chemicals, there are plenty of other fields for this work. We shall see one point in this connection in the article on *Iron and Iron Compounds*. There are scores of chemicals which must have value as fertilisers or fungicides, if it was only known, and the way to find out is, of course, to try them by experiment.

Many things of great value have been discovered by experiment. Certainly the value of sulphate of iron was found out this way, and so also was the value of carbonate of soda (washing soda), as a fertiliser for growing good onions. People saw the chemicals and tried them; they found they were good. It is for us to do similarly with other chemicals and see what they are worth.

It may be said that such experiments often involve great risk. If some poisonous compound be hit upon during the research, the plants may be killed.

That is true, of course, but it seems a cowardly thing to do to omit experimenting because there is a little risk. Foreign gardeners take risks; they do not fear them, so why should we?

A perfect plant-food for each of the five different kinds of soil recognised by gardeners remains yet to be discovered. It will probably need hundreds of experiments to solve this problem in a satisfactory manner. Again gardeners can help. If a single thousand out of the hundreds of thousands of gardeners there are in England would do one careful experiment on this point, and contribute details of their experiments to the gardening papers, we should probably have the answer to the problem within two years' time instead of having to wait the two hundred years which one prominent private experimenter has predicted will be needed. Is not this worth trying for? Would it not be a blessing? Our catalogues could then be cleared of all the patent fertilisers they now advertise, many of which are of such poor value.

Many other important matters open for and awaiting experiment might be mentioned, but we must say a word or two on the subject of

How to Make Experiments.—Mr Fred Chittenden, V.M.H., the director of the Royal Horticultural Society's Garden and Experimental Station at Wisley, a man who has probably conducted and superintended more experiments than any other man now living in this country, told us the secret of carrying out successful experiments in a word or two. He said that the secret was "to have two or, if possible, many more plots, the condition and nature of which was identical except for the particular dressing to be tried."

Thus if a reliable experiment is to be tried we will say, for instance, with potassium pyrophosphate—a chemical the value of which as a fertiliser nothing, we believe, is known,—two plots at least, the soil of which is in an identically equal state as regards nature, condition, and fertility, are selected. The plants are set out on the same day, by the same person, at the same time, at the same distance apart, and the same number of plants set on each plot. They are given the same amount of water, at the same time, by the same person. Their cultural treatment is precisely the same. The crop is gathered on the same day, by the same person, at the same time, and weighed on the same day, at the same time; and, in a word, everything is done in the same way, by the same person, at the same time, to the plots, with the exception that one of them is dressed with potassium pyrophosphate and the other is not.

To get very accurate results the land should have all been treated in the same manner for the last six or seven years, or if that is not possible, the experiments should be conducted on plots freshly dug out of grass land in order that there can be absolutely no loop-hole or different conditions. This is the way experiments should be done,—the only safe way,—the only way of being certain of getting accurate results.

When experiments are done with spraying liquids,—insecticides or fungicides,—great care should be taken not to let any of the liquid be blown on to the plot or plots supposed to be left without a dressing. As it is frequently impossible to avoid this in the ordinary way of working, precautionary steps must be taken. At any rate the plots should be 4 ft. from each other; and if the liquid must be applied during windy weather, direct the nozzle of the machine in the opposite direction to the way the wind is blowing. Where, however, the experiment is very delicate, and it is of vital importance to omit getting any single trace of the liquid on the control plots, some arrangement such as a screen or a temporary wall should be put up, and then there is no chance of the liquid straying.

It is, of course, of extreme importance to make detailed memoranda of observations gained from both the treated plot and the control plot from the very day on which the experiment was started. In this connection nothing should be considered too trifling to set down. Trivialities—as they appear to be—may be the kernel of the problem. We need not press this beyond this point.

Many other practical points might be described in detail. But in our present limit of space we must confine ourselves to what appears above. If any gardening author should perchance to read these lines with more care than other people, we might say that a simple book on "How to Experiment in the Garden" is very badly wanted. Perhaps he will oblige us by writing it,—we hope so anyway. There will be no difficulty to find a means of distributing it to gardeners.—E. T. E.

GARDEN FENCES.

A garden, large or small, is incomplete without a fence of some kind. In providing fences for the various phases of the garden, for utility and appearance, special circumstances have to be taken into account. For a kitchen garden there is no fence equal to a wall, be it brick, stone, or a composition.

Not only is this more substantial than any fence could be, but it is so useful for the cultivation of fruits and choice climbing plants.

It would be difficult to suggest any particular subject to make a fence for any special site, as circumstances on the spot must determine the best type to be employed; suffice it must to name some of the many subjects adaptable for this purpose.

Deciduous Subjects.—Of these, none can compare to the white Hawthorn, commonly known as Quicks. These not only provide good shelter, but also a guard against cattle of all kinds without any danger to the animals, as in the case of yew for example. A Quick fence can be grown to any height, and can easily be kept in good condition if the foundation is properly laid. By two annual cuttings an established fence can be kept very neat, and quite impervious to cattle. It is a moot point whether the Quicks should be planted singly or in a double row. Both methods produce a good fence if the plants are cut hard back the same season of planting, and not allowed to run up too quickly afterwards. Bear in mind if height is quickly obtained it will generally be at the expense of a thin base, and when once this error is made it is difficult to correct it, except by drastically cutting down the fence to within 1 ft. of the base; whereas if the foundation is properly laid there is no need for that. For a single row of plants three to 1 ft. should be allowed. For a double row 10 ins. between the rows, and also between the plants, should be the distance apart.

Deeply dug, well-manured soil, weed-free ground for some years afterwards is important, since the shrubs cannot progress properly when the soil is robbed of its food, and the roots almost choked by weeds.

Beech and Hornbeam make a capital fence where cattle are not allowed, as they are apt to eat the young shoots in spring, which naturally does harm to the fence.

Myrobalan Plum is in places much employed for its quick growth, but such fences are not so closely grown.

Living Fences.—These can be plentifully provided; the quickest growing subject is *Cupressus macrocarpa*, but it is subject to suddenly dying in places, and if not properly pruned, the plants are liable to blow over. Where, however, an extra quick growing subject is required, this subject is desirable.

For a fence 10–20 ft. high *Thuya Lobbi* is probably better than anything else. Its growth is so rigid, and does not occupy more than a yard width at 20 ft. high. For sheltering an orchard this is the subject to plant, but not near the sea where the site is windswept; stout plants 3 ft. high, put in 1 yd. apart, quickly adapt themselves to the site.

English Yew provides a neat fence, high or low, of any width. It requires very little attention when established beyond once clipping during the year, and August is the best month for this operation. [On account, however, of its leaves being poisonous, it must never be planted within the reach of animals.—Editor.]

The most serviceable evergreen fence of all is the common Holly (*Ilex Aquifolium*), and it is quite impervious to cattle, absolutely wind-proof, and gives little trouble beyond needing an annual clipping. The first week in April is the best time to plant.

Another cheap, quick growing fence plant is found in Evergreen Privet (*Ligustrum vulgare*). This gives good shelter, and is neat though not attractive beyond its deep green leaves.

Common Laurels (*Laurus rotundifolium caucasica* and *colchica*) also make capital fences or screens, which are neat and serviceable. The plants grow rapidly and are easily managed. One cutting with sécateurs is sufficient; this gives the fence a more natural appearance than when the ordinary garden shears are employed, which invariably cut the leaves and rob the plants of their natural appearance. The common Euonymus makes a capital fence, especially near the sea.

For some sites coloured fences are desirable, and such may include *Aucuba japonica variegata,* golden Holly, golden Privet, *Retinospora plumosa aurea,* and golden or silver Euonymus.

There are various flowering subjects that can be appropriately employed. *Berberis Darwinii,* with its attractive orange-coloured blossoms, and *Escallonia macrantha,* near the sea, are two of the best subjects imaginable; and so neat in growth. The Tamarisk, too, near the sea, is valuable.

Preparation of Fence Sites.—No matter what subject is employed, its ultimate success is largely governed by the preparation of the site. Where the soil is light in character, preparation is simple; deep digging and manure will quickly produce a desirable fence. Where the soil is stiff, with a stiffer subsoil, especially if very wet, much more preparation is then required. Without due regard to this foundation success cannot be achieved, or at least it is much hindered. All sites a yard wide in such soil should be trenched at least 2 ft. deep, an ample supply of manure being incorporated in the first spit of soil to encourage free root action, which means extended branch growth. The plants growing in trenched soil do not suffer nearly so much in dry weather as those in stiff, impervious soil: the trenching conserves the moisture.

Early autumn planting generally succeeds better than at any other period, except for some few evergreen subjects which are best put in in early April.

Artificial Fences can at times be advantageously employed. For instance, if a herbaceous or rose border is arranged in the centre of the garden on each side of a grass path, some screen is required to give effect to the border and shut out the view of the vegetables behind. For such a site rustic larch poles 10 ft. high, with the side spurs 8 ins. long, if left on the poles, provide an attractive fence, and a good support for rambling roses. A yard apart is close enough for the poles. They are easily fixed in the soil by the aid of an iron bar, and if not less than 4 ins. in diameter at the base, they last a long time and are easily replaced. Rustic oak or ash branches answer the same purpose.

For a low, wind-proof fence to shelter vegetables or flowers in frames or in narrow borders, a good contrivance can be made with evergreen branches, such as spruce and Scotch or Austrian pines. Stout stakes are driven into the ground on each side of the fence 2 ft. or so apart, the fence being made not less than 1 ft. wide and of the height desired. Between the stakes lay the branches neatly and securely, making them fast at the top with a strand of wire. Where rats are troublesome, close-meshed wire should be fastened to the fence on either side, or the rats will quickly spoil its appearance, and become a nuisance also. If the wire netting is fixed firmly in the soil on each side, the branches can more easily be arranged. Hedge trimmings, especially evergreen subjects, can be utilised for such fences.

Temporary shelters for seedling vegetables can be made easily with wire netting and straw packed between about 1 ft. thick, but these, naturally, will not last long; such structures may serve a useful purpose in the raising of seedling flowers or vegetables.—E. M.

[It should be noted that the names of the subjects suitable for fences are those by which they are generally known, and do not necessarily correspond with the new nomenclature adopted at Kew.—Editor.]

GARDEN FOES.—See *Garden Enemies*, *Garden Robbers*, and *Insect Pests.*

GARDEN FOLIAGE PLANTS.— See *Foliage Plants for All Purposes.*

GARDEN FRAMES.

No garden large or small, not even excepting the cottage garden and allotment, should be without at least one frame. It is of immense value in connection with the greenhouse, the vegetable garden, the flower garden, and, to a more limited extent, for fruit.

There are several types to suit different conveniences. For practical purposes we may class them thus—the heated pit, the hotbed frame, the cold frame, and the skeleton frame. Then there are different shapes such as the double span, and the single span, the latter form being decidedly the more general and, all things considered, the more useful.

The Heated Pit is usually built of bricks, the bottom being below the level of the surrounding ground. A single row of 3-inch piping along back and front, heated with hot water, will supply a steady heat for the vast majority of purposes to which it is likely to be put. In a pit of this description there is also the opportunity of partly filling the frame with leaves and stable litter, thus adding to the heat.

The Hotbed Frame. — This is usually a one- or two-light wooden frame, sometimes with span lights. It is put on the top of a bed of manure and used for raising half-hardy flowers and early vegetables. See article on *Hotbeds.*

The Cold Frame or Pit.—If a portable frame be used for this purpose, it should be set in a position where it will get the fullest amount of sunshine and preferably on a hard, dry bottom. If it is to be used for pot plants or plants in boxes, there should be a layer of coal ashes or shingle at the bottom to a depth of at least 2 ins. If seeds are to be sown, seedlings pricked off, or cuttings inserted directly into the frame, it will be necessary to make up a bed of soil. This may be done by spreading a layer of leaves over the bottom and covering this with at least 4 ins. of sandy soil and leaf-soil passed through a ½-inch sieve. In all cases the soil should be made firm, especially around the sides; and after this has been done and the surface levelled, a thin layer of sharp sand should be spread over the surface.

The Skeleton Frame is simply an open arrangement of wood so arranged as to support mats or the lights or sashes from other frames. A sheltered though not shaded position should be chosen for this, and a hard, dry level bottom surfaced with 2 ins. of ashes. A similar arrangement might be erected over a plot of ground set apart for pricking off seedlings. It is used simply as providing slight protection during severe weather. Additional protection may be given by tacking canvas around the sides.

The VEGETABLE GARDEN may benefit considerably by using the frames for forwarding plants during the early months of the year, and planting them in the outside garden (after gradually but thoroughly hardening them in the skeleton frame) in late March, April, and early May. The following subjects are amenable to this treatment: Beans (broad, dwarf, haricot, and runners), Broccoli, Brussels Sprouts, Cabbages, Cauliflower, Celeriac, Celery, Cucumbers, Globe Beet, Leeks, Lettuces, Marrows, Onions, Peas, and Tomatoes. These should be sown preferably in a heated frame or, failing that, in a cold frame several weeks before they would be sown in the usual way outside.

Forced vegetables may also be procured by means of heated frames of such subjects as Asparagus, Beans (French and haricot), Carrots (Short Horn), Cauliflowers, Cucumbers, Endive, Globe Beet, Lettuces, Marrows, Melons, Mint, Mustard and Cress, Peas, Potatoes, Radishes, Rhubarb, Seakale, Spinach, Tomatoes, and Turnips. A commencement may be made in late autumn and continued until the produce is available from outside sowings.

The FLOWER GARDEN may benefit from the use of frames by the propagation of all kinds of half-hardy subjects, such as Ageratum, Alyssum, Alternanthera, Calceolaria, Fuchsia, Heliotrope, Lobelia, Marguerite, Pelargonium (Geranium), Pentstemon, Viola, and similar well-known bedding plants. Practically all kinds of rock plants may be propagated from cuttings in a cold frame in the summer months. Frames may also be used for the sowing, pricking off, and hardening of Alyssum, Antirrhinum, Asters, Clarkia, Lavatera, Petunia, Stock, Verbena, Zinnia, and practically every hardy or half-hardy annual which will bear transplanting.

Carnations, Dahlias, Early-flowering Chrysanthemums, *Lobelia cardinalis*, Phloxes (herbaceous), Roses, Salvias, Shrubs, and Sweet Peas may also be propagated in frames.

The GREENHOUSE will benefit largely and in innumerable ways from the use of frames for purposes of propagation by means of seeds, cuttings, and layers, for giving cool condition during the summer and ample protection in the early months of autumn. A list only of greenhouse plants which spend part of their career in a heated or cold frame would more than fill our available space. A frame built against the low wall of the greenhouse proves a great blessing for such purposes.

The essentials of a good frame are that it be rain-proof, the glass being firmly bedded in putty. The wood should be coated with three coats of good white lead paint, especially where it rests on the ground. [Green can be used for the outer portions except the lights.—EDITOR.] If the frame be portable it should not be too large. For a two-light frame, 8 × 6 ft. should be the maximum size.

SHADING for a frame may be provided by covering it with canvas, tiffany, or mats, or if a permanent shading is preferred, a cheap mixture is lime made thin, with sour milk or buttermilk. This may be painted over the glass, and can easily be washed off with hot soapy water.

VENTILATION may be provided by using small blocks of wood cut into steps, so that more or less air may be admitted as desired. This is by far the most convenient method, though bricks or stones may equally serve the purpose.

PROTECTION FROM FROST is best provided for by means of Archangel mats augmented during severe frost by a layer of litter, straw, hay, or bracken. The sides may be protected by banking soil, ashes, or heating material against them, keeping it in place with boards or wattle hurdles.—W. F. R.

GARDEN FRIENDS. — See *INSECT FRIENDS.*

GARDEN FURNITURE.

It would appear that the beauty of the garden has at all periods been enhanced, and its pleasures increased, by the addition of "furniture." Old gardens show traces of the use of portable furniture, but oftener still they contain the remains of the solid and permanent character of the arbours, summer-houses, rustic seats, and stone or lead figures once so prominent in old English gardens. To-day the furniture is of a less substantial character; it is, however, none the less useful, and adds to the beauty of the garden or lawn upon which it is shown.

Reminding readers of the more important furniture suitable for use in the garden, the chief divisions are as follows:—

Chairs and Awnings.—Large seats, usually 6 ft. long, are used in parks and conveniently distributed in large gardens. Iron ends and frames, frequently painted, are the best; the laths should be of wood, painted green or grained; if of oak or pitch pine, they must be well varnished. Single and double seats, with or without arms, are also made in a similar way. Those in general use are folding, and are easily carried about. Lounge chairs, covered with striped canvas, the larger ones preferably with awnings, are useful. Among other varieties are folding cane garden or deck chairs, so-called lawn or beach rests, and folding stools. (See also paragraph on SEATS.)

Flower Stands.— There are many places where fixed or portable wooden flower stands can be erected; painted green, and furnished with a plentiful array of plants in bloom, such stands are an attractive feature in the garden. Wire stands are useful in conservatories, and some of the portable types are suitable for the garden also. In the form of baskets too, wire work is a nice addition to the garden, and makes suitable receptacles for hanging plants, etc. (See article on *BASKET PLANTS.*)

Folding Furniture.— Folding chairs (to which reference has already been made) may be supplemented by tables, lawn settees, and camp furniture. Folding tables are easily erected on the lawn, and can be readily removed; the frames should in all cases be of hard wood, and, preferably, polished self-colour.

Footstools.— In damp weather a supply of footstools is invaluable; they should be made of laths on short legs raising them well out of reach of the damp grass.

Hammocks.—There are many types of hammocks which can be slung from trees or supported by specially made folding legs or sticks; the ideal hammock has an awning over it, and is furnished with comfortable cushions. As in so many other garden furnishings colour adds to the beauty and attractiveness of the hammock. The best position for a hammock is in a shady spot in full view of gay flower borders.

Leaden Figures.—Leaden and stone figures were among the garden ornaments of olden times, and modern replicas of old styles are favourite adornments of the garden planned on antique lines.

Rustic Furniture.—Rustic seats, and ornamental arches and trellis, are described in other articles; they may be supplemented by chairs, seats, small tables, and numerous furnishings in this very attractive style—one in which the amateur can score.

Seats.—The permanent seat of wood and stone is an excellent architectural addition to the garden. Such seats can be constructed round large trees, in suitable corners, or cut into a hedge, shrubs and evergreens being trained to form overhanging canopies. The surroundings of garden seats should be in harmony, and good garden work in conjunction added to secure restful seclusion. Some seats may well be in full view of colour borders and pleasure grounds, while others may be hidden away in arbours for those who want rest and quiet talks.

Summer-houses.—The summer-house is, of course, structurally a work of greater magnitude than the mere arbour or seat contrived in wall or fence. Many summer-houses are large and roomy, and require a certain amount of furnishings—seats, tables, and the like. Care should be taken in selecting a suitable location, which ought not to be too much exposed to the sun in summer or to the east winds in winter. Their decoration, including coloured glass and blinds, should not clash with the surrounding foliage or blooms. (See also article on *GARDEN SUMMER-HOUSE.*)

Sundials.—The old sundial is a relic of days gone by; it is, however, one that is clung to as being an ornament, and a reminder of the old English garden in which it once was considered a necessary feature. Many modern replicas of old dials with their quaint mottoes are now made, and their instalment in a garden modelled upon old-fashioned lines is a desirable addition.

Tables.—The tea-table is a necessary fitment in a modern garden, and a small work table is useful in a summer-house. There are round, oblong, and fancifully shaped tables of wood available, and some with ornamental iron frames; others are made in rustic wood, and many charming little drawing-room tea-tables are equally suitable for garden use.

Tents.—Garden tents vary from the small shelters from sun or rain to marquees accommodating large numbers of people. LAWN TENTS with woodwork painted green, and covered in with striped canvas, with extensions, are made in several stock sizes. There are also TENNIS TENTS with open fronts erected on jointed poles, with brass mountings and complete with adjustable centre tables; and UMBRELLA TENTS and BELL TENTS in endless variety, all adding to the delights of garden or park.

Vases.—Vases mounted on pedestals, replicas of ancient Greek types, were formerly made chiefly of lead, but latterly of terra-cotta or other less costly materials. When filled with flowering plants they are pleasing additions.

Wicker Work.—Garden furniture of every description is made up in wicker work, and furniture of this kind is probably the most welcome. It is light, portable, and inexpensive, and, when duly cared for, lasts many years in garden or summer-house.

F. W. B.

GARDEN GATES.

Gates for dividing portions of the garden, used in connection with trellis and other fencing, may be made of similar materials. Such work can be performed by an amateur—indeed the gardener or amateur carpenter is generally more successful in making appropriate gates and fences from a rural standpoint than the professional workman.

Solid wooden gates, unless used in conjunction with a close-paled fence, should be avoided. Light frames of wood, with feather-edged pales placed a few inches apart, look very well, and the upper portion can, if desired, be raised by a light trellis of laths, either in square form or diamond-shaped to correspond with an adjoining fence. Rustic fencing is much favoured, and gates to correspond can be made quite easily. In some instances where bamboo trellis is used, gates of the same material answer very well, in which case all the joints should be firmly wired and screwed. When the gate is at the end of a path it should, of course, be the same width as the path, although when an entrance to some other portion of the garden is needed in a continuous fencing on the lawn or approached by a narrow side path, it can be made wide enough for the purpose for which it is required. It is advisable to remember that the gardener may want to use the gate for his lawn-mower, roller, or water-barrow, and any knocking of the posts or gates should be avoided.

There are several points to observe when hanging gates, the most important being the strength and rigidity of the posts, which last, according to the weight and size of the gates, should be sunk deep into the soil, that portion below ground being well tarred. If the soil is light, some stones and a little cement or concrete should be well rammed round the stumps, which some say should be placed upon half a brick to prevent sinking. The posts must be perfectly upright, and the gates hung preferably with hooks and bands, and fitted with a good catch. A very slight tilt might with advantage be given to cause the gate to close naturally, but if it is important that it should close tightly a spring must be added.

The size of the garden gate is, of course, governed by circumstances and surroundings ; a gate giving entrance to the garden from the yard or street ought to be at least 4 ft. wide ; a smaller gate leading from one part of the garden to another may be smaller, preferably about a yard—a good width for a path.

Gates should be painted or stained to match the fences. If painted, "garden green" is most appropriate, but if a gate is inserted in a privet fence, or in conjunction with iron or wire fencing, stained and varnished oak is recommended.

Iron gates must be made by a smith, or they can be purchased ready for attachment with bolts and nuts to wood posts or continuous iron fencing. Frequent painting of these in industrial districts is essential, otherwise they will be quickly rusted and ruined.—F. W. B.

GARDEN GEOLOGY.

The thickness of the soil and rocks with which the gardener is concerned is insignificant as compared with that of the underlying strata. The soil may be made more or less independent of the mass beneath in so far that its mechanical and chemical constitution can be varied by the addition of manures and by drainage. It is, however, distinctly related to the substratum ; in many cases the soil has been derived directly therefrom, and is dependent on it for its supplies of moisture. For this reason, then, in estimating the suitability of ground for horticultural purposes, we have to consider, as regards the substrata, certain factors that are the least likely to change, and that are, consequently, the most worthy of attention.

The layers of deposits at the earth's surface are acted upon continuously and in varying degree by meteoric agencies (frost, heat, rain, etc.), with the result that a subsoil and a soil are formed. (For an account of the manner in which these are produced, see article on *SOILS : THEIR ORIGIN AND NATURE.*) The soils that cover the surface vary in nature from light sands, through loams, to stiff clays ; but their boundaries are not so sharply defined as those of the subsoils and the strata beneath them. It is within the province of geology to determine the nature and extent of the beds that come to the surface in all parts of the country. A geological survey of a district, moreover, includes details of the arrangements of these beds, and determines whether they are tilted or folded or broken by faults ; and in addition, notes their mineral character. Results of such surveys are recorded on maps, of which the great advantage is that all the features of any area can be reviewed at once. Moreover, as they are published officially and on uniform scales, they afford a trustworthy basis for investigation, and so save much individual labour.

Drift Geology.—The arrangement of the beds to which we have just alluded, constitutes what is known as the *solid* geology of a district, and maps recording their features are called "solid" maps. There is, however, an important series of superficial deposits which owe their origin to processes that took place comparatively late in the history of the earth. Such are the gravels brought down by rivers, and boulder clays resulting from glacial action, included under the general name of *Drift.* These deposits, masking the underlying solid rocks, often cover extensive areas; the maps that represent them are accordingly termed *Drift Maps. Drift Geology* is, therefore, of the first importance to the horticulturist, for in no country have the actual soils been mapped. At best, a Drift map is to be regarded as a subsoil map, and in the case of "sedentary" soils necessarily affords direct indication as to their nature. In other cases it can, with careful interpretation, give much useful information as to subsoil, water, and drainage. The details of topography included in the Drift map must be taken into account in judging the character of soils, for the configuration of the ground is intimately related to geological structure. Thus, hard rock-bands tend to stand out prominently on the surface, and the softer beds to be worn away to lower levels. The soil on hard beds is almost always thin, partly because it is dispersed to lower levels and accumulates at the bottom of slopes. Over large areas of generally uniform level, such as tracts of alluvium and plateau country, the soils are, as a rule, of a "sedentary" nature. In general terms, the formation of a soil in a given area depends on the relationship between weathering and transport.

Permeable and Impermeable Beds.—It is not necessary to consider in detail the mineral character of all the prevailing rock-masses. Although numerous varieties of both crystalline rocks and stratified formations may be recognised, the soils to which they give rise are few in number, and the rocks themselves, for our purpose, need to be considered simply as permeable or impermeable. Soils resting on sand, gravel, chalk, or other permeable beds are warm and well drained, while those resting on clay, marl, brick "bind," or other impervious material are cold, and apt to be water-logged. Moreover, formations distinct geologically may give rise to soils almost identical; on the other hand, sedentary soils originating in the same formation may alternate between sand and clay, or may be calcareous in one part and non-calcareous in another. The geological status of a formation is, therefore, of far less importance than its mineralogical character. But, however rich a soil may be in plant-food, it will be rendered useless by a superabundance or lack of water. Since the fertility of a soil obviously depends largely on water-supply, geology is of prime importance as yielding information concerning the beds that underlie the soil, and their respective value as water-bearers.

Kinds of Rocks.—We will now review briefly the salient features of rocks and their arrangement. The term "rock" in geology is used for all constituent masses of the earth's crust, whether hard or soft, loose or compact; and includes, therefore, limestones, clay, gravel, sandstone, and sand, as well as the crystalline rocks made up of aggregates of minerals, *e.g.* gneiss or granite. Three broad divisions of rocks are recognised: the *stratified* or *sedimentary* rocks, *i.e.* those laid down by water and wind; the *igneous* or crystalline; and the *metamorphic*, those that have been re-formed by the agencies of heat and pressure. The igneous rocks have welled up in a molten state from the deeper portions of the earth's crust, sometimes filling fissures in the rocks that they have invaded. Heat, moisture, and gases proceeding from them have altered adjacent rocks, and the effects of these, subsequently enhanced by the pressure attending the crustal movements of the earth, have caused the formation of metamorphic rocks.

By far the greater part of the surface of this country is occupied by the stratified or sedimentary rocks. These were originally deposited in layers, one above another, but where, as commonly, their approximately horizontal position has not been maintained, they are tilted or arched, or folded in basin-shaped structures. Often, owing to surface wear and tear, only the upturned edges of the beds are exposed. In some places the rocks constituting hill-tops form "outliers," *i.e.* surface erosion has cut them off from main masses some dis-

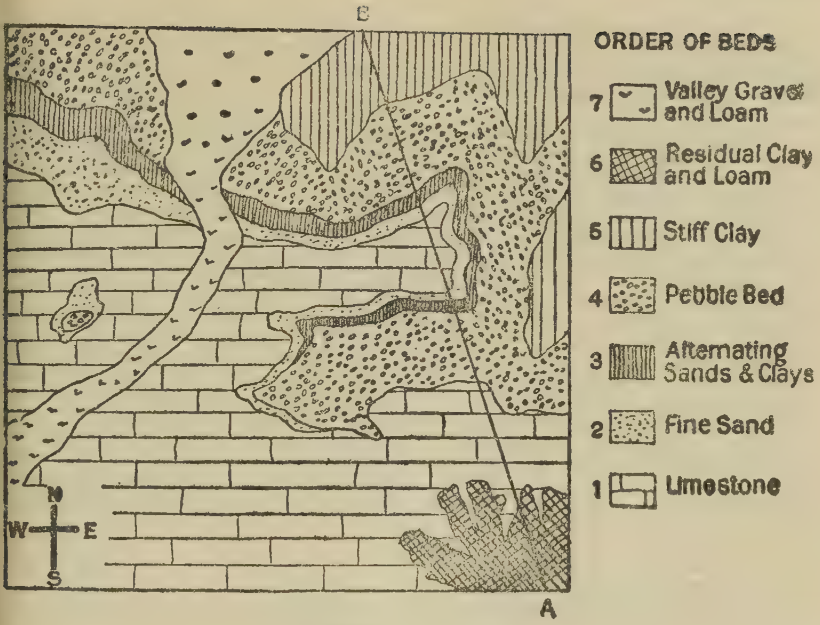


FIG. 1.

EXPLANATION OF MAP.

Underlying the whole area, and coming to the surface in the south, is a thick limestone, which slopes or dips towards the north. This is overlain in the northern part of the area by a thin bed of fine sand, above which is a series of clays and sandy beds. Above these is a thick pebble bed, which extends over their edges on the south, and rests eventually on bare limestone (see section). In the north-eastern part of the area this is overlain by a stiff clay. The surface of the south-eastern part is occupied by a residual clay (formed by the dissolution of the limestone) which contains stony fragments of other beds. On high ground towards the west is an "outlier" —a patch isolated from the main mass; and extending north and south is a tract of valley gravel and loam left by a stream that formerly flowed through the country. The relations of the beds are represented on the diagrammatic section along the line A–B. (See Fig. 2.)

Springs are thrown out along the line of the lower clayey beds (3), but on the south side of the pebble bed (4) the water soaks directly into the limestone, leaving the surface dry. The water falling on the pebble bed sinks through and leaves a stony surface of barren ground. The limestone is porous and dry, its soil being a thin, friable loam. The overlying sand (2) forms a thin, light, and unproductive soil, loamy in parts. Around the high-lying outlier the soil is sandy and dry. The upper clay (5) forms rolling ground, with a thin, cold, limeless clayey subsoil. Rich, moist, loamy soil is found on the tract of the valley gravel. A thin capping of stony clay and loam marks the area of the residual clay, and forms a sharp contrast with the surrounding limestone.

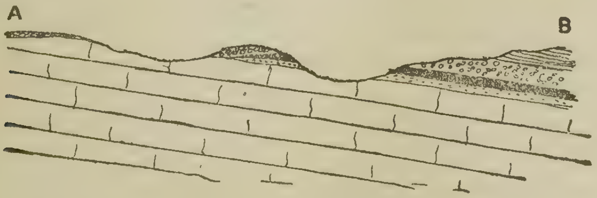


FIG. 2.—Section along line A–B.

(The vertical scale is exaggerated.)

tance away; or the removal of the upper portion of an arched series of formations has exposed the older beds within a ring of the newer, thus forming an "inlier."

Water-bearing Rocks.—The arrangement of beds must be considered in its relation to the water-bearing capacity of rocks. The water in rocks is derived originally from rainfall, and the amount that percolates into the ground depends on the texture of the soil, and the disposition of the underlying geological formations. Loosely aggregated beds, *e.g.* sands and gravels, absorb a large quantity, while the more or less impervious beds throw it off the surface, whence it flows to join streams and rivers. The absorbed surface-water sinks until it reaches an impervious stratum, or arrives at the level of underground saturation (the water-line). The inclination of an impervious stratum often results in water being thrown out at a lower level in the form of springs. Thus a thin parting of clay, marl, or other only slightly penetrable rock may have a marked effect upon the distribution of moisture, and it must be carefully borne in mind that these partings are often irregular or discontinuous, and may be intercalated in beds of generally pervious rock; thus a thin layer of marl may be found to run through a great thickness of chalk, and layers of clay through Tertiary sands. Places where such an arrangement of beds obtains are usually marked by distinct types of natural vegetation.

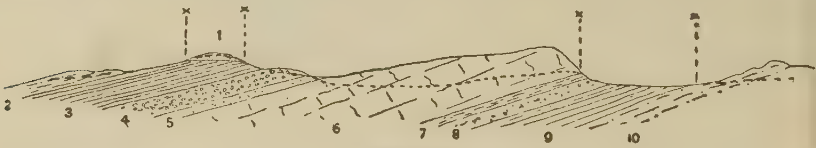


FIG. 3.

1. Superficial gravel. 2. Sands. 3. Stiff clay. 4. Coarse pebbles. 5. Sandstone. 6. Soft limestone. 7. Marl. 8. Sand. 9. Clay. 10. Sandstone. Water-table indicated by - - - - - - - -. Springs are thrown out at the places marked × ×. On bed 1 is a "perched" water-table.—C. P. C.

The application of the general principles of geology even on a small scale can be of great assistance in the laying out of a piece of ground. As an illustration we will consider the area represented on the accompanying map (p. 399).

Choice of Sites.—We can now discuss in a general way the requirements of gardens in their relationship to geological features as read from a map, or as ascertained from actual observation. Probably the least desirable sites of all (except perhaps for the rose garden) are those where clay uncovered by superficial deposits such as brick-earth or gravel comes close to the surface over extensive areas, the soil being wet and cold, and the subsoil very thin. In some cases, however, *e.g.* the Gault vale between the slopes of the Chalk and Greensand of the South of England, the clay often presents a covering of sand and limestone fragments brought down from the higher ground near by, and an effectual system of drainage turns the clay to good account. Thick sandy beds are impoverished for plant growth by water passing through them, but they are improved where they thin out, because, by mixing with fragments of the neighbouring strata, they are provided with the elements that they lack. Consequently, at or near the junction of a sandy stratum with other beds, an increase in the depth and productiveness of the subsoil is usually noticeable, and such a site would be most suitable for the vegetable garden if the family is fond of deep-rooting crops. The subsoil everywhere acts as a regulator of the amount of water contained in the surface layer, that which percolates into it during rainy periods being given up again by capillarity to the surface soil during periods of drought. A subsoil at a suitable level, and containing a fair proportion of loam, offers a good promise of success in kitchen gardening. Where a bed of sandy rock forms the substratum is found the place suitable for a wild garden, and in sites where the rock is exposed a rock garden should be made.

In hot weather porous beds are, as

a rule, moister than clays, and a soft limestone, *e.g.* chalk, is generally sufficiently moist to keep a lawn fresh, although the grass on subsoils above other rocks may suffer. For a fernery a shady place at the junction of permeable with impermeable beds provides an ideal situation.

Superficial Deposits.—We have already alluded to the superficial deposits, and to their great importance in relation to subsoils. Of these, two principal classes may be recognised; the *residual* and the *transported.* The former class are chiefly the result of weathering, and include such beds as high-lying gravels and clays. Such a deposit, for instance, as the clay-with-flints and accompanying loam, resulting from the dissolution of chalk, has a widespread range, and is found to exert a marked influence on the vegetation in contrast with the surrounding porous chalk. The most extensive of the superficial deposits are the valley gravels and loams, the soils of which have benefited in fertility by the thorough mixture of their constituents in transit, and are fairly uniform in depth. Their position causes them to be well supplied with subsoil water, and the loams afford valuable sites for market gardens.

C. P. C.

[A word more may well be said on the matter of water. If the gardener, for instance, wants to make a pond or other ornamental piece of water, he should choose as a site for this not the wide tract of porous limestone so abundant in the central and southern portion of the map, or he will have to put a very thick "puddle" of clay all round and over the base of the proposed pond. The ideal site would be in the stiff clay bed in the north-east and east portion of the map, for here very little puddling would be needed.

Again, if he wished to bore for water, it would be foolish indeed to start boring in the limestone in the south-west corner, for he would have to go very much deeper, until he came on some impervious bed. He should, of course, start his boring anywhere in the pebble bed; if he starts just north of the band of alternating clays or sands before it bends south, he will come to water very soon. Should he start farther north-east in the pebble bed, he may have to go deeper, and if he starts in the stiff clay in the north-east corner, he will have to go through this and through the pebble bed before he comes to water. Water could be easily obtained by boring through the pebble bed in the north-west corner of the map, but it would be waste of time to start in the fine sand below the band of clay on which the pebble bed rests. The natural springs issuing from the base of the alternating bands of clay and sand make such positions ideal for water gardens, and by a little arrangement such springs could be made to drain into the northern portion of the valley gravel to make it suitable for moisture-loving, hardy, herbaceous, and other plants.—EDITOR.]

GARDEN HEDGES.

While some people in regard to garden hedges seem to have no ideas beyond Green or Golden Privet, it still remains an actual fact that the material available for hedges presents a very wide range, offering suitable subjects for every position. There is no reason, consequently, why any proposed hedge should not be made a beautiful garden feature. Even to ensure privacy, ugliness need not and should not be tolerated. If Privet *must* be employed, the golden form is a thousand times better than the green, and can be grown equally as dense. Only, to maintain the bright colouring of the leaves, refrain from making the ground over-rich. If everybody agreed with the writer, the majority of the green Privet hedges would soon be scrapped.

A warning, however, should have gone in front of all this. Hedges *are* grave concerns. Overhaste to plant them is to be deplored. Hedges are the curse of thousands of tiny gardens—front and back. In such there is so little space to utilise for flowers that it is positively sinful to occupy it with a permanent hedge that represents so much waste opportunity, robs the soil of nourishment, and also starves the smaller plants of light and air. If there were fewer hedges in our villa and cottage gardens there would be more room for and more possibility of beauty, and a considerably reduced demand for plants for shady situations. Plants now languishing under the worst possible conditions would take a new lease of life, and a hundred flowering subjects might perhaps be added where now, maybe, there are less than a dozen. If we have to do without, say, Roses and Chrysanthemums, surely that is too great a price to pay for privacy. In such gardens as those described, to add a hedge to the boundary walls or fences is usually a grievous error. Where it is added, it should generally be restricted to the height of the said wall or fence. Against an open fence of wood or iron, an uncommon subject to plant is the Laurustinus (*Viburnum Tinus*), a handsome evergreen, with, from autumn to spring, trusses of dainty white buds tinged with pink. In good soil this can be grown to form a very compact hedge, either low or tall. It does well by the seaside (south and west), and also in the district around London.

Evergreen Hedges.—These are, of course, to be preferred. For a strictly utilitarian purpose, such as barring cattle, there is perhaps nothing better than a combination of Hawthorn and Beech or Hornbeam, the Hawthorn on the danger side or next to the field or common. Holly is not being forgotten. Indeed, it might stand first were it less expensive and if it succeeded in every position. It may be regarded either as strictly utilitarian or as useful and ornamental. Other subjects that are classified in the latter fashion are Yews, *Cupressus lawsoniana* and *Cupressus nootkatensis*, *Thuya gigantea*, *Thuya occidentalis*, and *Thuya orientalis*, Laurels, Golden Privet, Box, and many varieties of *Euonymus japonicus*, all of which are evergreen. *Thuya occidentalis*, the American Arbor Vitae, is generally esteemed for the deep bronzy tint of its foliage in winter. *Thuya Lobbi* might also be mentioned. Fast-growing, it quickly makes a hedge over 12 ft. high, and will likewise soon become thick if frequently cut. *Cupressus lawsoniana* is another rapid grower that will also make a close hedge. For low, compact hedges, select *Retinospora squarrosa* or *Retinospora plumosa*, and *R. plumosa aurea*. These give little trouble once they get into growth. Of Laurels, the Caucasian form is specially hardy, and the Portugal Laurel will make dense growth; but these are more utilitarian than decorative, and for this latter quality we must go to the variety *Prunus Laurocerasus*, the Cherry Laurel.

Planting, etc.—From March to April is about the best period for planting hedges of evergreens. To ensure good growth, thoroughly prepare the ground, digging it 2 ft. deep and working in plenty of manure. Nothing less than this will suffice if the hedge is to "carry on" for years. Two specimens to a yard will be sufficiently close. If dry weather follows planting, the ground should be soaked with water twice a week. In May it is desirable to surface the ground about the plants with a layer of manure 2 ins. thick, put down after a good watering, and left throughout the summer. Prune Laurels in February and August, Yew in August, Conifers in September or October, Privet whenever it has grown in the least degree untidy, Holly in July, Beech, Hawthorn, and Hornbeam in mid-August. As far as possible use a pruning knife. Clipping with the shears mutilates many of the leaves left behind, causing much disfigurement. Holly ought to be allowed a certain amount of freedom.

Decorative Hedges.—To conclude with purely decorative hedges, which may or may not be permanent, according to requirements, there is nothing better for these than such Roses as the Common China, the beautiful Penzance Briers, and, for greater height, Wichuraiana Roses and *Rosa rugosa* in variety. The majority of these are of rampant growth, but easily trained, requiring nothing more than stakes and wire for supports. The best time to plant is in late October or November, pruning, according to class, in the following March. Spring planting is also permissible, but new growth will be much later in starting. Ground preparation must be precisely as usually recommended for Roses. Lavender, our last shrubby subject for a decorative and permanent hedge, will be highly appreciated. Plant in September. For temporary hedges, often required to provide a screen during summer and autumn, there are Sweet Peas, Scarlet Runner Beans, Morning Glory Convolvulus, Canary Creeper, tall Nasturtiums, and Minas. Plants of all these are easily raised from seeds sown in spring, and, being of an *annual* character, die down and are no trouble to clear away in autumn.

W. F. M.

GARDEN LABELS.

Sometimes we go round other people's gardens with a view to studying the rare plants they have taken their lifetime in collecting. It is always a great disappointment, not to say annoyance, to us when we find the plants are there without labels.

We consider that labels are a necessity in every garden where choice plants are grown. And what garden is there that cannot at least boast of half a dozen or so choice plants?

Three simple types of labels are shown below :—

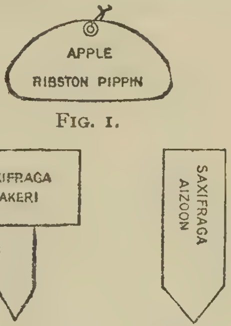


FIG. 1.

FIG. 2.

FIG. 3.

FIGS. 1, 2, 3.—Garden Labels. The first is undoubtedly handy for hanging on to fruit trees. The second and third are very useful in the rock garden (especially the second) or in the general garden.

Labels should not be too large or too small. The one depicted in Fig. 2 will not be less than 4 ins. in total length, and the wooden tally shown at Fig. 3 should, as the case may be, be from 4–8 ins. long. Shrubs and roses require big labels, rock plants small ones.

The writing on labels should be large, clear, and easily readable. The label shown at Fig. 2, being faced with zinc, is written with special ink. Wooden tallies such as Fig. 3 should be lightly rubbed with white paint, and written with a hard indelible pencil while still wet. Wooden labels need renewing nearly every year, or at any rate they need scraping, repainting, and rewriting. The zinc ones last much longer, but need cleaning from time to time.

Care should be taken when working in the rock garden, shrubbery, or on the borders not to displace labels, or if they are by accident removed, to replace them properly without delay.

Indelible Ink must be used on all metal labels exposed to the air, as ordinary ink would not show up enough and would "run" at the first shower of rain. Various prescriptions have been suggested, but no ink is better than that made by dissolving two well-heaped tablespoonfuls of copper sulphate in a pint of writing ink. The mixture should be kept well corked up, and be thoroughly shaken before and during use, as with some makes of writing ink the copper forms a sediment. A moderately thick and fairly soft nib gives the best results, and labels so written should be allowed to dry thoroughly before being put in the open.

Ink Stains may easily be removed as follows :—See that the hands do not get really wet while the stains are upon them, and taking a piece of ordinary common soap, moisten it very slightly, and rub it until quite dry on the hands. Repeat the process a second and third time, and when nearly dry, well rub the hands together so that the soap gets into the skin. After a few minutes put the hands under the tap and rinse them slightly with warm water, rubbing them together meanwhile. If all the ink does not come off immediately, dry the hands and repeat the soaping in the same way as before. Hands so treated will be fit to use for greeting one's friends in a very few minutes, whereas if they are washed in the ordinary way the stains may stick on for many days.

GARDEN LITERATURE.—See *LITERATURE OF THE GARDEN.*

GARDEN LORE.

To the inquiring mind there is no branch of garden literature more fascinating and in a measure more instructive than Plant and Flower Lore, with its quaint medley of fact, fancy, and fiction.

It is a subject far too complex and of too great a volume for us to deal with it *in extenso* in these pages. But the curious in such matters will learn much concerning the myths, superstitions, folk lore, reputed curative properties and other attributes of, and relating to, the various objects in the vegetable kingdom, by consulting some of the authorities who have written on these matters. They are many and diverse. We do not pretend to give a complete list of such works, but merely a selected one which will be helpful to the reader who may develop an interest in this department of horticultural literature.

The old herbals are brimful of reputed cures for every ill that flesh is heir to; some of them, it must be confessed, requiring great faith in these later days, and are of undoubtedly overrated efficacy. In other directions Garden Lore furnishes abundant evidence of the simplicity and gullibility of human nature. Quaint customs are sometimes associated with plants and flowers, which also form emblems and symbols in certain circumstances. The Lily was long associated with the Royal Family of France; the Rose, in the days of the Wars of the Roses, bore a significance long since lost; the modest Violet was the chosen emblem of Napoleonic sympathisers.

So the reader in the following works, outside practical gardening, will discover much of this peculiar knowledge that will entertain and instruct him :—

Deas, Lizzie. *Flower Favourites: Their Legends, Symbolism, and Significance.* 2nd ed. 1914.

Dyer, Thistleton. *The Folk Lore of Plants.* 1883.

Folkard, Richard. *Plant Lore, Legends, and Lyrics.* 2nd ed. 1892.

Friend, Rev. Hilderic. *Flowers and Flower Lore.* 2 vols. 1883.

Phillips, Henry. *Flora Historica.* 2 vols. 1829.

Pratt, Anne. *Flowers and Their Associations.* 1846.

Skinner, Charles M. *Myths and Legends of Flowers, Trees, Fruit, etc., in all Ages.* 1911.

Tynan, Katharine, and Maitland, Frances. *The Book of Flowers.* 1909.

C. H. P.

GARDEN MEASURES.—See *WEIGHTS AND MEASURES.*

GARDEN MINT.—See *MENTHA*, and under PEPPERMINT in *POTHERBS.*

GARDEN NETTING.

Netting of some kind is absolutely essential in gardens where much in the way of small wall fruit, bush fruit, or choice vegetables are grown. It is of various kinds, and some of the most important are mentioned, with their uses, below:—

Fish Netting.—This is usually cheap in most fishing towns, and is effective for general garden purposes. It can be used for protecting seed beds from birds, for keeping birds off wall fruit, and for many other purposes. The gardener should not buy it in bagfuls as he is so often asked to, but by the piece, and should see that none of the cords are broken or greatly worn, otherwise the netting will not last long.

Ordinary Garden Netting.—This is made of string or cord in various meshes and qualities. It is exceedingly useful for temporary work over fruiting bush trees or wall trees to keep the birds off them. As a rule it is not very strong or durable, and should be kept as dry as possible. It should always be spread out for a day or two in full sun to dry before being put away.

Peach Netting.—This is a name often applied to the little bags of muslin or other soft white material which are hung up on Peach trees and Nectarines in July for the fruit to drop into. Without its use the fruit would be damaged to a large extent by falling on hard stagings or floors. WASP NETTING, to protect ripening fruit from wasps, is often made of similar material.

Tanned Netting. — This and TARRED NETTING are the two most useful materials of all. They can be used for every purpose to which netting is applied. A few of the most important uses are as a protection for wall, small, and bush fruits; for keeping birds from seeds; for keeping birds out of frames; and even for training runner beans and climbers as a kind of trellis. STRAWBERRY NETTING, the use of which is so well known, is of this class.

Wire Netting.—This, which is made in various classes and of widely varying meshes, has many important uses in the garden. It is most useful for training climbing plants such as Nasturtiums up to form a quick growing, attractive screen. It is useful for training many summer flowering plants outside, or for the more fragile plants in the greenhouse and conservatory. If cut into strips about 18 ins. wide, and a little wire twisted over the cut ends, the strips can easily be bent into half-moons to form what are known as SEED PROTECTORS, which are more fully described in our article on *GARDEN APPLIANCES.* If narrow-meshed wire netting is sunk all round the garden a foot or so below the surface and the same distance above the ground-level, the garden will be protected to a large extent from rodents and other vermin. What is known as GALVANISED WIRE NETTING is quite the best. This lasts for a very long period, instead of rusting away directly as ordinary iron wire netting would do. It should, however, always be well painted before use as a training medium, since otherwise the surface zinc upon it is certain to injure the plants, and may considerably retard their growth.—E. T. E.

GARDEN PAINT.—See *PAINT IN THE GARDEN.*

GARDEN PATHS.

The pleasure of a garden depends in no small measure on its paths. If they are badly made, loose and soft and wet, it is impossible to get about without discomfort after rain or during a thaw. But proper construction is not the whole of the matter: they should also be in the right positions. In some gardens, especially small ones, there are far too many of them; they occupy so much ground that the area available for cultivation is seriously diminished. Every path should have a definite object. It should lead from the road to the house, from the house into the garden, or from some particular part of the garden to another. There should never be a doubt as to its *raison d'être*. If one will serve two objects, it is a mistake to go to the trouble and expense of making another, and by so doing reduce the space for flowers and vegetables. [A small point, but very important.—EDITOR.]

It would seem to follow that paths should be straight in order to serve their objects in the shortest time; and in the utilitarian part of the garden, where fruit and vegetables are grown, they nearly always are straight. But in the more ornamental parts of the grounds, among the flower borders and close round the house, other considerations prevail. The paths in Nature are never straight. They wind up the hills and down the valleys and meander through the woods, perpetually diverted from the direct line by some obstacle, such as a tree or a bank. The result is charming. There is no monotonous regularity, and the view, instead of being exposed all at once, is unfolded before the eye in a series of pictures. Here, as always, the gardener should endeavour to imitate Nature. He must plan out his paths in curves pleasing to the eye, and, in order not to irritate those who have to use them by sending them needlessly out of the straight line, he must have an obvious reason for every divergence. If a sufficient reason is not already in existence, he must supply it by planting a tree or a group of shrubs. A flower-bed is not a sufficient reason, for it might just as well be anywhere else. Even a lawn between the entrance-gate and the house is hardly a sufficient reason for sending the path round instead of across it, especially as it may tempt many persons to make a short-cut across the grass and so to wear an unsightly track. Hence in such cases the usual tree or group of shrubs at the entrance from the road.

After the paths have been planned, their positions being marked with sticks along which the garden line can be laid, the next thing is their construction. Those between the road and the house which may have to bear heavy traffic should be stronger and broader than any intended merely for foot-passengers and an occasional wheelbarrow. The breadth of the entrance-drive should not be less than 8 ft., and it would be better 10 ft., which is the ordinary width of double gates. It should increase around the front door of the house sufficiently to let two vehicles stand side by side, and, if there is only one set of gates, sufficiently to allow of turning. In the garden itself the breadth need not exceed 4 ft., though grass paths, being considered ornamental as well as useful, are often a good deal more.

Construction. — One method of construction is to excavate to the depth of about 18 ins., making the bottom slope downwards from both sides to the middle. The soil taken out can be used for forming a bank or for altering the level of the ground elsewhere. Along the middle, 3- or 4-inch drain-pipes are arranged; over them is placed a layer 1 ft. deep of broken bricks or large stones which are rammed down firmly, then a 3-inch layer of coarse gravel rising 2 ins. from the sides to the middle to form a "crown," and finally a 3-inch layer of fine gravel, raked smooth and rolled down hard. The result depends a good deal on the gravel. Some kinds — those obtained from the seashore, for instance—always remain loose. Others are kept firm with very little difficulty, the reason being that they contain an admixture of clay which binds the stones together. When a loose gravel must be used, some dry clay should be procured if possible and sifted into it.

It was contended by MacAdam, however, that an elaborate foundation was unnecessary. If, he said, the surface was made impervious to rain, the natural earth underneath must always remain firm and dry; and all macadamised roads are constructed on this principle. Comparatively little excavating is done; there is no deepening in the middle and no drain there; the lower layers of bricks and stones are much reduced in thickness, but the surface is made as hard and smooth as it can possibly be made, and the "crown" is sufficiently pronounced to run all water away to the sides. In light land this water will soon sink into the ground, but if it collects at particular spots a few "soak-aways" should be made. This is done by digging square holes, lining them with loose bricks, and covering them with iron gratings laid about 1 in. below the level of the path. In heavy land it may be necessary to lay down drains at the sides, and at intervals to make "soak-aways" with pipes leading down to the drains. In such cases the upper end of each pipe should be slightly above the bottom of the "soak-away," so as to trap any mud washed down and to allow only the water to escape. This mud should be cleared out occasionally before it reaches the top of the pipe. In suburban districts the drains can usually be connected with the main drainage from the house, but in the country they must be run into a ditch or into a pond, which may have to be dug for the purpose if nothing of the sort exists.

Further Materials.—Other materials of which paths are sometimes made besides gravel are coal ash, asphalt, stone, and turf. Coal ash and asphalt are not ornamental, and if used should be confined to the kitchen garden. Even there they have disadvantages, for asphalt is apt to get very soft and sticky in hot weather, and an ash surface breaks up badly after frost. Flat pieces of stone are popular, especially for paths in the rock garden. They can sometimes be obtained very cheaply when streets are being repaired. They should be laid down in an irregular patchwork. In the spaces between, dwarf Thyme and other similar plants may be grown.

In the flower garden no kind of path looks better than one made of turf. As the majority of new houses are built on grass-land, all that has to be done in such cases is to mark out and dig the various plots and to leave the turf where paths are wanted. Probably the grass may seem to be hopelessly rough and weedy, but an astonishing change can be effected by cutting and rolling, the worst weeds being taken out completely with an old knife. If seed has to be sown, the procedure should be exactly the same as in making a lawn. Of course, on grass paths the wheelbarrow should be used as little as possible,—never when they are very soft,—and it should not be dragged up or down the edge, but should be guided over it by means of a wedge-shaped piece of wood. With this precaution they are not much trouble to keep in order. With frequent cutting and rolling, and an occasional scrub with the stump of a broom if moss appears on them, few weeds have much chance.

Weeds on Paths.—In gravel paths it is different. Owing to their gritty nature seeds germinate and grow rapidly, and unless they are destroyed at once they cause a great deal of work. The old method of dealing with them was to use the hoe; the modern method is to apply a weed-killer, though not close to live edgings, for there it might damage the plants. A weed-killer, if in sufficient quantity, destroys not only the growing weeds but also their seeds; the hoe does not injure the latter, and probably passes over some of the former. A weed-killer leaves the surface undisturbed; the hoe breaks it up, leaving it loose in summer and soft and uneven in winter. In all respects, therefore, a weed-killer is the better. There are many excellent kinds on the market, but if the gardener wishes he can make one very cheaply by diluting carbolic acid (No. 5) with from 80 to 100 times its bulk of water. If the surface is thoroughly wetted a single application should keep a path clean for a whole year, provided that the ground is moist at the time and that heavy rain does not fall for two or three days.—H. C. D.

GARDEN PATHS: Draining. — See *DRAINING*.

GARDEN PEA.—See *PEAS* and *PISUM*.

GARDEN PESTS.—See *INSECT PESTS*.

GARDEN PINK (*Dianthus plumarius*). See *DIANTHUS*.

GARDEN PLANNING: AIMS TO BE KEPT IN VIEW.—The nature and area of sites vary so greatly, that it is only possible to make certain general remarks on what are the most desirable aims to be kept in view. The first duty of the designer is so to treat the ground that, with due regard to utility and convenience, it shall be in accordance with the style and calibre of the house, and, above all, that it shall be beautiful and entirely enjoyable. A garden must be a place of repose and charm, with varied forms of interest, each one of which should be kept separate and thoroughly well worked out. Many a garden is spoilt by a fussy jumble of details, each one of which, if treated carefully and quite apart by itself, would be a success: whereas the attempt to display all together is only confusing and distracting, and a place which ought to be for comfort and happiness becomes a source of mental worry, perplexity, and weariness. To take an example: if there is a beautiful distant view from any part of the ground it is better to approach it through a grove of quiet planting, so that it is framed by green things that are not in themselves showy or insistently attractive. If the view is seen over an elaborate parterre full of bright flowers, the full effect of both is lost. The parterre is in place near the house, overlooked from the house itself, or from a terrace immediately adjoining it; it should have its own background, also, of quiet greenery. Some of the most beautiful examples are where there are large trees and a lesser undergrowth—not so near as to rob or overshade the garden, but taking their own place as a dignified background and shutting off the flowery parterre from any other of the garden delights. The same principle holds good in the choice of shrubs and plants; the best result can only be secured by the exercise of an almost severe restraint. Each portion should have its own character and show some definite intention; although the complete garden, by the skill of the designer, is so linked together that one part follows another in orderly sequence and takes its appointed place in the co-ordination of the whole. The designer should give the place just those trees, shrubs, and plants that it needs and that will best serve to make it beautiful; not one each of a great number of kinds. The different sections of a large garden will provide for the placing of a considerable number of various sorts, but if these are wanted for their own sakes in a garden of small or moderate extent, they should be in a special place and, frankly, as a *collection*.—G. J.

GARDEN PLANS.

A plan for the garden is every bit as important as a plan for the house, and nobody would dream of building without one. Moreover, additions to a house are liable to be awkward unless the original was planned for extension, and this applies equally to the laying out of land. Indeed a definite plan, drawn up when the house is built, is the more necessary, as complete development is seldom possible after the expenses of building have been met. Following a set plan the garden can be continued year by year, and the cost spread out so that really good material and adequate labour can be allowed. Preliminary operations in land cultivation should never be poorly done; a garden stinted in its first stages wears a callow look for years.

What, then, are the points in a garden plan? Let us first consider the ideal plot and its position. Its boundaries should not be too regular in outline, and the road frontage should lie on the northern side. This enables the best rooms to have a sunny outlook to the garden, and also throws the shadow of the house off the terrace. The land should slope (if at all) towards the south-west, and be naturally drained by a subsoil of chalk or gravel. A few matured trees will be an additional attraction. The architect and garden designer should consult together on the exact position of the house, as a few yards one way or the other may make all the difference in the utilisation of existing trees, or economy in working levels. The skeleton plan required by the garden designer shows the boundaries, levels, position of house, and any special features that need to be preserved. All except the latter can generally be obtained through the architect who has needed one himself, but the position of fine trees, etc., may have to be measured by the garden designer. At the same time he will note good and objectionable view points. Diagram A shows a plan ready for his work.

Two distinct styles of garden design are recognised: (1) The formal or geometrical, which is the earliest method of dealing with land; and (2) the landscape style, which aims at imitating Nature. Boundaries are disguised, and the extent of the plot made to look larger than it is by means of winding walks, partially masked by clumps of trees and shrubs growing on artificial mounds. "Let your garden be grand, beautiful, and natural," was the cry of Batty Langley and his followers, whereas Proportion, Unity, and Utility were the watchwords of the formal school. There is no need to touch on the points of the wild controversy that raged round the merits of the two systems, as now most designers recognise both sides, and work on a compromise; treating the immediate vicinity of the house in accordance with its lines, and gradually blending with the natural gradients of the ground.

However, in small gardens (which are in the majority) there is not space for both methods to be united, and the designer must adopt one or the other from the beginning. Diagrams B and C show identical plots of land treated first in landscape fashion, secondly in formal. It must be remembered that a plan does not show changes of level, and in both No. 1's the ground has been partially modelled, and altered from its natural flatness. In B No. 1 the pond lies in a hollow, and the soil from the excavations gives a gentle rise all round on which the summer-house stands, the path ascending thereto. On the other side the shrubs are raised, and the pond and paths are concealed from the house. In C No. 1, the ground has been raised on the S.E. side before the path splits to surround the oval plot, so that a person coming along the path cannot see what lies beyond. Both these examples largely depend for success on the arrangement and quality of the trees and shrubs, and unless evergreens are freely used, the garden will be uninteresting as soon as the play of light and shade ceases with the approach of winter.

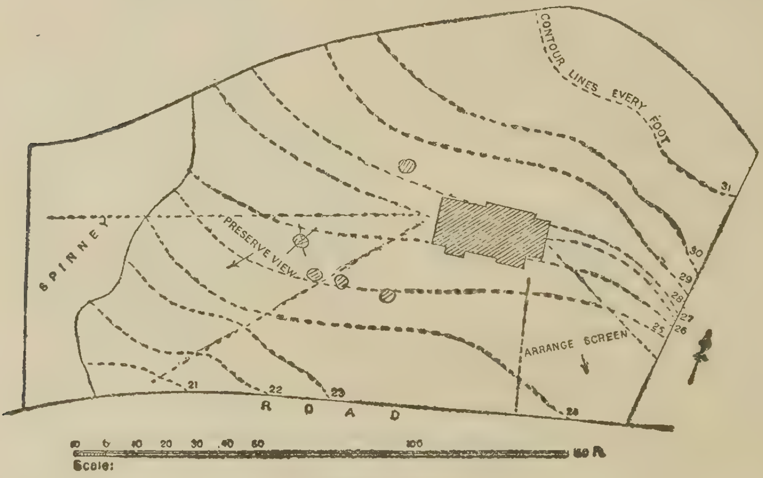


DIAGRAM A.

In the No. 2 designs there is no attempt to disguise the uncompromising nature of a flat, oblong strip. The only disguise (if it can be so called) is introduced by screens, in one case a hedge, in the other a rose trellis, which divides each plot into two compartments. These geometrical gardens are less dependent on the seasons for their beauty. Their lines are always pleasant to the eye whether sprinkled with snow or in summer verdure. On the other hand, the flat surface gives less variety under sun and shadow, morning and evening lights, as when the surface undulates. They require the utmost care in upkeep, for the least shagginess of grass verge or hedge makes them look forlorn, whereas in a garden treated in landscape style, a little wildness conforms to the general idea.

When additions have to be made

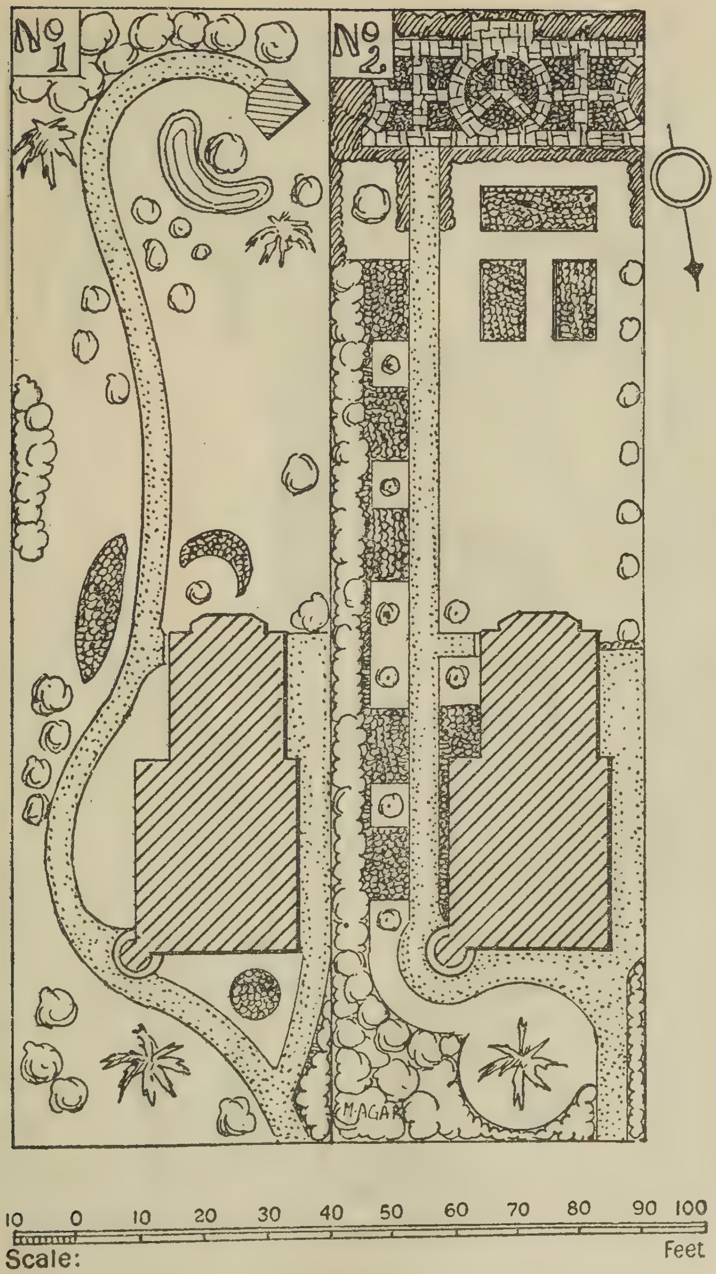

No 1
No 2
M. AGAR
10 0 10 20 30 40 50 60 70 80 90 100
Scale:
Feet

DIAGRAM B.

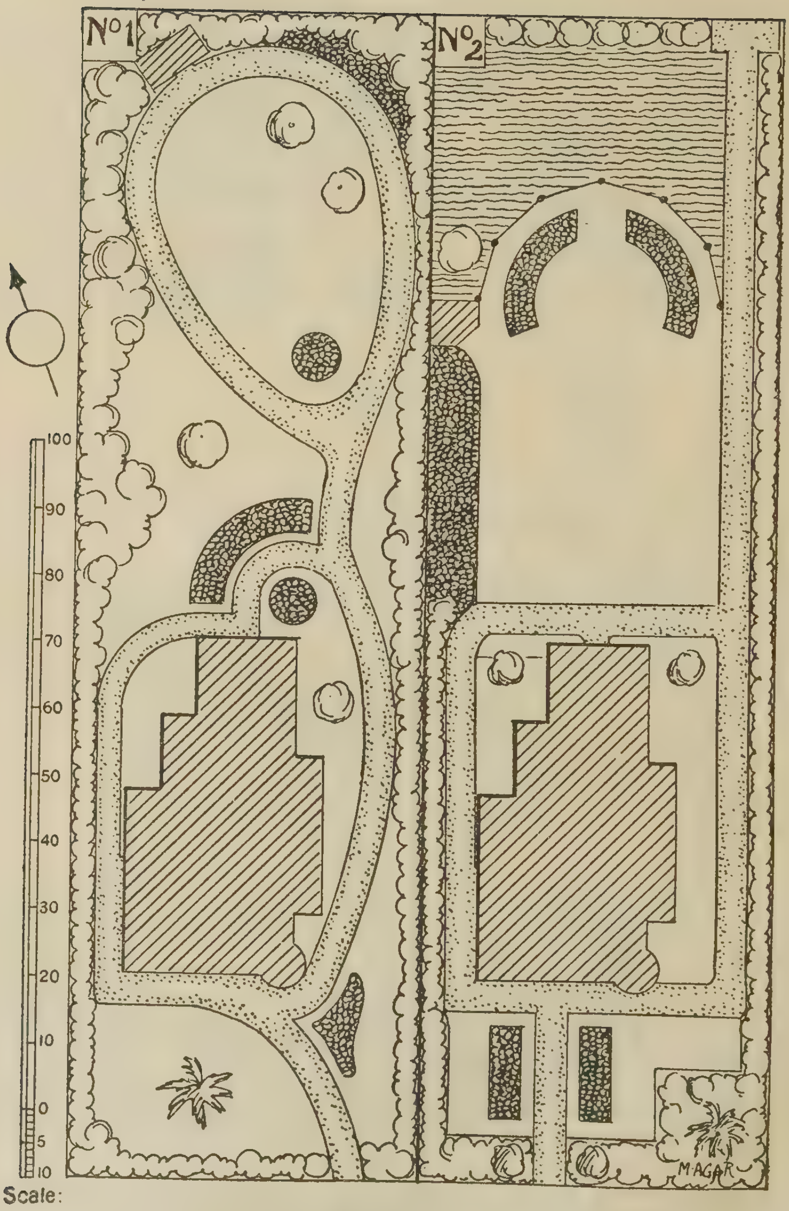

No 1
No 2
100
90
80
70
60
50
40
30
20
10
0
5
10
Scale:
M. AGAR

DIAGRAM C.

to a garden for which no provisions exist, the best way is to carry forward the main path into the new land. If this path originally took a turn in order to surround the plot, the turn can be arranged to look as a side path to the new long walk. The boundary hedge or belt of shrubs, no longer needed for a screen, can have spaces cut through it, and by adding a few extra shrubs, the old hard line can be completely altered. Diagram D shows how simply this can be accomplished. The dotted lines are the outlines of original shrubbery beds and path, and it can be seen how little is needed to change their character.—M. A.

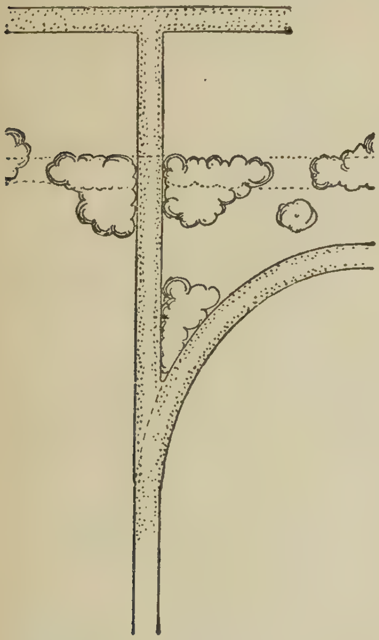


DIAGRAM D.

GARDEN POETRY.

If the reader takes up a book, such as the *Garden Anthology*, he will be astonished to find how few poets have written of the garden as a whole, and how many have been content with the description of single flowers, or of the thoughts which sitting or walking in a garden suggest.

Spenser, it is true, in his poem, *The Fate of the Butter Flie*, gives us an accurate account of the garden of his time, but from the catalogue of plants found in it, it is clearly a garden more of sweet-scented herbs and simples than of flowers—and it is worth turning to by the curious in these matters. Milton, too, in his *Paradise Lost*, draws a careful picture of a garden bower, where, mid laurel, myrtle, and acanthus shade, "Each beauteous flower reared high their flourished heads between, and wrought mosaic"; but he perhaps purposely forgets the seasonable coming of the flowers, for he tells us how at the time of rose and jessamine in this garden, the violet, crocus, and hyacinth embroider the ground.

It is not till later times that the poets were tempted to write of the garden as we know it, though we do not forget that Andrew Marvell described flowers in a garden as "at parade," and that Giles Fletcher pictured the garden as: "A lady fair that lay as if she slumbered in delight."

The historic garden in later literature is that "orchard-garden eminently fair" at Townend, Grasmere, which was William Wordsworth's garden and study in one. His descriptive poem was written at the end of May 1802 when he left Grasmere to fetch his bride. We quote some of it below:

"Dear spot! which we have watched with tender heed,
Bringing thee chosen plants and blossoms blown
Among the distant mountains, flower and weed,
Which thou hast taken to thee as thine own,

. . . .

"Oh happy garden! whose seclusion deep
Hast been so friendly to industrious hours;
And to soft slumbers, that did gently steep
Our spirits, carrying with them dreams of flowers,
And wild notes warbled among leafy bowers;
Two burning months let summer overleap,
And coming back with Her who will be ours,
Into thy bosom we again will creep."

Keats, whose description of Sweet Peas in blossom is one of the most beautiful in our language, has left us many allusions to flower life, but we must go to Shelley for a real garden poem, and this we find in *The Sensitive Plant,* which is too long to quote, but delightfully dainty in every part of it.

Matthew Arnold in *Thyrsis,* after a fine description of the result of a wind-storm in a garden in early June, gives an admirable account of the second blossom time :

"Soon will the high Midsummer pomps come on,
Soon will the musk carnations break and swell,
Soon shall we have gold-dusted snapdragon,
Sweet-william with his homely cottage smell,
And stocks in fragrant blow ;
Roses that down the alleys shine afar,
And open, jasmine-muffled lattices,
And groups under the dreaming garden-trees,
And the full moon, and the white evening star."

Tennyson-lovers will remember his description of the Somersby garden in Cantos 89 and 95 of *In Memoriam.* They will go to *Maud* and *The Gardener's Daughter* and find many tender touches of garden painting, and if they wish to realise Autumn, its scent, and sight in a garden, they will find no better account of it than in *The Song.* It is, alas, somewhat long to quote here.

William Morris wrote nothing more simple or beautiful than some passages in *The Garden,* such as :

"I know a little garden close
Set thick with lily and red rose,
Where I would wander if I might
From dewy dawn to dewy night,
And have one with me wandering."

There is real charm about this poem, and much the same may be said of T. E. Browne's poem *My Garden,* which is so terse and epigrammatic that we must quote it in full :

"A garden is a lovesome thing, God wot !
Rose plot,
Fringed pool,
Fern'd grot—
The veriest school
Of peace ; and yet the fool
Contends that God is not—
Not God ! in gardens ! when the eve is cool ?
Nay, but I have a sign ;
'Tis very sure God walks in mine."

Glorious as are our gardens full-lit by summer sun, there is, as T. E. Browne knew well, a charm and mystery which has peculiar power upon our spirits when the sun has set and blue eventide has fallen upon grass and flowers, and this John Keats knew when he wrote his *Summer Night* :

"I cannot see what flowers are at my feet,
Nor what soft incense hangs upon the boughs,
But in embalmèd darkness, guess each sweet
Wherewith the seasonable month endows
The grass, the thicket, and the fruit-tree wild ;
White hawthorn and the pastoral eglantine ;
Fast-fading violets covered up in leaves ;
And mid-May's eldest child,
The coming musk-rose, full of dewy wine,
The murmurous haunt of flies on summer eves."

But with all the gladness of a garden, there is a note of sorrow in the swift passing of its short-lived splendour. Herrick voices this for us in the following lines *To Blossoms* :

"What ! were ye born to be
An hour or half's delight,
And so to bid good-night ?
'Twas pity Nature brought you forth
Merely to show your worth
And lose you quite."

No account of gardens, as described by the poets, would be complete without allusion to Rudyard Kipling's *The Glory of the Garden,* of which I quote the first and last verses only :

"Our England is a garden that is full of stately views,
Of borders, beds and shrubberies, and lawns and avenues,
With statues on the terraces and peacocks strutting by ;
But the Glory of the Garden lies in more than meets the eye.

"Oh, Adam was a gardener, and God Who made him sees
That half a proper gardener's work is done upon his knees,
So when your work is finished, you can wash your hands and pray
For the Glory of the Garden that it may not pass away !
And the Glory of the Garden it shall never pass away !"—H. D. R.

GARDEN RHUBARB (*Rheum Rhaponticum*). — See *RHEUM* and *RHUBARB.*

GARDEN ROBBERS.

Of the enemies the gardener has to fear, none are greater than Garden Robbers. These are not usually grown men and women, but young scamps or juveniles of both sexes, who rob gardens more for the sport of the game than for the produce they get.

We consider it is of little use to praise the existing treatment of such scamps. English Law treats them badly and often makes them worse instead of better. We may say that we consider girls as bad as boys in robbing gardens, especially the "tomboy" girl, who is, alas! so common in modern times.

The old way is to catch your robbers first and then summon them at the local Police Court. They may be sentenced to gaol, or to a reformatory, for the paltry offence of stealing a few apples, pears, cabbages, or peas. In either case they come out worse than they went in; they have been in most cases hardened instead of mortified, and are determined to "get their own back somehow." They have learnt all manner of tricks during their confinement, through contact with persons worse than themselves, and when they get out again they very often do something far worse than the stealing of apples.

The method below would, if adopted, be much simpler, more effective, and better in every way. It is well known that most young persons of modern times hold a respectful dread of corporal punishment, and advantage of this should be taken. The birch for the boys and the cane for the girls would, if properly used, soon stop them robbing gardens. The young scamps know they have only got what they deserved. They are not taught worse mischief as is the case when they are sent to prison or reformatories, and they soon learn to realise that stealing will not do. One of the contributors of the Dictionary, a gentleman we have the highest respect for, told us when we were chatting the other day about garden robbers of his method of dealing with them. When first he went to live at a new house in the country he was continually losing his apples, and when it came to a valuable new tree being stripped of fruit he determined this sort of thing must stop. He knew that the thieves were a group of rough young people in the village. The following night he had a dish of apples brought into the library, and he determined he would sit up. His two gardeners lay concealed in the garden near the orchard, and about ten o'clock some of the young scamps appeared. Two of them—a boy and a girl—got into a tree and started pitching apples down to the others. The gardeners came upon them unawares; the rest of the robbers escaped, but the two in the tree were caught and marched up into the library. Our friend was waiting for them, and when the gardeners had withdrawn from the room, he turned to the boy, "Young man," he said, "you have been stealing my apples. Don't you know it's wrong to steal, eh? Well," he continued, "you must learn your lesson this once. Get over that chair!" Our friend gave the young scamp a dozen biting strokes with his cane. Then he turned to the girl. "Now, young lady," he said, "if you think that because you are a girl I shall let you go without feeling this, you are mistaken. Get over that chair at once!" "Yes," he told us, "I was bold enough to give her six cuts of my cane, and she never murmured a sound. After I had caned both of them," he continued, "I sat them down by the table, and handed them the apples. At first they would not touch them, but at length I managed to induce them to eat two each. After they had finished I told them that when they wanted some apples they were to come and ask me for some, and then I let them go. I have never lost any apples since. That's the way to treat them," he concluded, smiling—"no prison or legal proceedings, simply a homely but effective way," and we certainly agree with him.—E. T. E.

GARDEN ROLLERS.—See *GARDEN APPLIANCES.*

GARDEN RUBBISH: Burning.—See *BURNING GARDEN RUBBISH.*

GARDEN SEATS.—See SEATS in *GARDEN FURNITURE.*

GARDEN SHOWER.—An appliance used for sprinkling. See SPRINKLERS in *GARDEN APPLIANCES.*

GARDEN SOCIETIES: Letting of Land for Benefit of.—See PRIVATE GARDENS: GARDEN SOCIETIES, in *GARDENING LAW.*

GARDEN STRAWBERRIES. — See *FRAGARIA.*

GARDEN SUMMER-HOUSE, THE. A pleasantly placed and planned summer-house is so great a gain in a garden that it is well worth considering how it may best be made useful, besides serving as an attractive feature in the garden landscape. The planning of the grounds will govern its position, but it is generally understood that it is a place of temporary rest from which there is a good outlook on flowers and pleasure ground or on some beautiful distant view. It may be anything in quality or degree from the Banqueting House of our Tudor and Jacobean ancestors to the simplest structure of slab and thatch; but nothing is more desirable in any garden than a really comfortable summer-house—such a place as may be used as a quiet retreat for reading or writing in the summer months. There may often be seen some little building, say of 10 ft. square, that might well serve such a purpose, but that is quite useless because it is not properly lighted. If the light comes only from the entrance opening, it is never comfortable, but a window at the back or side makes all the difference. It is all the better if the little house can be entirely closed and have a fireplace, for then it becomes available as a tea-house—pleasant for grown people and a delight to children. Whether opened or closed, if the walls cannot be all of brick, there should be a brick base that comes three courses out of the ground; a wooden framework is then built, to be covered outside with elm weather-boarding. The roof may be also of weather-boarding or of thatch or tile. Thatch is warm in winter and cool in summer, but is apt to be much pulled about by sparrows, and is difficult to repair, though it has a good appearance. Tile is best—permanent and well-looking. The inside should also be boarded, the boarding continued on the under-side of the rafters. This is also best of elm, and if properly done makes the whole snug and completely weather and draught proof. "Slab" is the word used in timber yards for the outside of the tree trunk first sawn off; slabs also make a good side walling for a summer-house; their edges are first trimmed straight and they are then nailed on upright to the framework; oak are the best, and if set on the brick base will last for many years, though they are rather less durable than weather-boarding. The floor should be of flagstones, paving brick or tile, or cement. If there is a fixed seat its proportions should be carefully considered; but the following measurements may be advised: the seat itself 17 ins. from front to back and 15 ins. from floor to its upper side. The back of such seats is usually made to slope too much, so that it does not rightly support the spine; if it slopes back one inch in six it will be enough.

There are many examples throughout the country of well-built summer-houses, both open and enclosed, dating from the time of Elizabeth to the early years of the nineteenth century. In the case of palatial places some of them were purely for decoration; such as the pillared pavilions or domed temples of Palladian architecture, the purpose of which was solely to secure a dignified full-stop to a garden vista. But in both earlier and later, as well as contemporary, examples there were delightful little houses of one room, of stone or brick, as carefully planned and built as the main house, and closely related to it in character and decoration. In some of the larger places they stand as a finish to the end of a raised terrace, giving a commanding view of the parterre below, or they were reared at the four angles of a great wall that enclosed the flower and vegetable garden. These are commonly of two storeys, the ground floor serving as fruit room or root store or some such purpose, and entered from the garden level, while above is a beautifully finished room with access from a raised terrace or "mount" and perhaps directly overlooking the moat.

There are but few good examples of garden houses from the earlier part of the nineteenth century till lately, but, with the revival of interest in gardening and a more intelligent comprehension of all that it embraces, the need of a better class of summer-house or garden-house has been felt, and the architect is now called upon to design them, more especially as so many people now take a wholesome pleasure in having their meals served in the open air.—G. J.

GARDEN SUNDIALS.—See SUNDIALS in *GARDEN FURNITURE.*

GARDEN SWEDES.—See *SWEDES.*

GARDEN SWIFT MOTH.—See *INSECT PESTS.*

GARDEN TENTS. — See TENTS in *GARDEN FURNITURE.*

GARDEN TOOLS.

The tools employed in gardening are many and various; and on their judicious selection, and the treatment subsequently given to them, time, labour, and efficiency depend. They should be strong enough to do satisfactorily the operations for which they are designed, and their size and weight should, so far as is practicable, be adjusted to the physical capabilities of the user. Large and heavy tools that can be easily handled by a strong and experienced labourer may prove altogether unsuited to the amateur who does gardening solely as a spare-time hobby. On the other hand, tools so fragile as to be unable to stand any strain are obviously useless. Fortunately, many tools now on the market are made with the view of minimising the amount of physical exertion and economising time in working.

The care of the tools is a matter that should receive some consideration. In large establishments, where the equipment is more or less complete, a tool-shed is usually provided. There the old motto should be enforced: "A place for everything, and everything in its place." But however few the tools, it is bad policy to leave them lying about exposed to all weathers; not only is their period of usefulness seriously curtailed, but the labour involved in using them is considerably increased. A corner, therefore, should be found for them under cover. All soil implements should be scraped clean, and the iron or steel points wiped with an oily rag; further, if put away for any length of time, they should be looked over occasionally, to see that rust has not started on them. Tools used for cutting, such as pruning knives and saws, sécateurs and shears, should be wiped free from sap and moisture. A file will be found handy for keeping a sharp edge to spades, hoes, etc.; and a hone will be equally serviceable for tools with cutting blades.

Of the tools required for cultivating the soil, the spade, fork, and hoe are the most important, and should be provided in even very small gardens, being regarded as the minimum equipment. In practice it will be found convenient and helpful to supplement these with others specially adapted to different uses; while in large gardens, where the work is more complex, these other tools are an absolute necessity to save labour and ensure efficiency. The following are among the principal tools employed. With some of them patterns vary considerably with the different makers. See also *GARDEN APPLIANCES.*

Aphis Brush.—For removing aphides (green and black fly) from Roses and other plants. The handle is of brass or steel, and is bent so that the brushes at each end face one another. A gentle pressure causes them to meet on the infested shoot, which is thus effectively cleaned.

Bill-hooks.—Long, flat, variously-curved blades, in a short handle, used for cutting undergrowth, small branches and hedges, pointing stakes, etc.

Brooms.—The best are made of Birch twigs. They should be kept dry, and well moistened before being used.

Daisy Grubbers.—Steel two or three-pronged forks fixed in a wooden handle, and with a projection at the head to give leverage in uprooting daisies, etc., from turf. *Dock Grubbers* are similar, but larger and stronger.

Dibbers or Dibbles.—For making holes in which to insert plants, bulbs, potatoes, etc. They may be all wood, or have the end sheathed with iron or steel. To ensure evenness in depth of planting, a transverse peg is sometimes fixed at the requisite distance from the point. A good dibber can be made from the handle of an old spade or fork. See article on *DIBBERS: THEIR USE AND ABUSE.*

Edging Irons (also called *Verge Cutters*).—A half-moon or crescent-shaped blade affixed to a long handle, for trimming edges of lawns, beds, etc. It should be kept well sharpened, also wiped dry and greased before it is put away. Where there is much work to be done, it is best to use an edge-cutting machine, on the principle of the lawn-mower.

Flower Gatherers.—Scissors so made as to hold the stem of the flower when cut, doing away with the risk of its falling and getting damaged.

Forks.—These are made in many styles, suitable for various purposes For digging, especially on medium soils—neither very light nor very tenacious—the three-tined or four-tined fork is better than the spade. The tines should be flat or square, and nearly straight from tread to point, with the object of minimising the amount of exertion required. For breaking up subsoil when trenching, lifting Potatoes, fining down surface soil, etc., a lighter fork with four narrow tines is useful; and for lifting and spreading manure, an even lighter one, with four or five curved tines and a longer handle, is the best. For weeding and stirring soil amongst plants, a handfork with three broad tines, in a handle from 6–15 ins. long, is serviceable. A modification of the fork, with the tines at an angle of about 90 degrees to the handle, is sometimes used for weeding, and cultivating the soil among Potatoes, Strawberries, and other plants that send out runners.

Grass Hooks.—Short, scythe-shaped blade, for cutting tussocks of coarse grass, trimming hedges, etc.

Hoes.—These are of many shapes, adapted to various uses, such as aerating the soil, keeping down weeds; forming a loose layer of earth on the surface, to conserve soil moisture and save watering; thinning out plants; making seed drills; and breaking down the surface for seed-sowing. The Dutch or push hoe is of several widths, with the blade at an angle of about 30 degrees to the handle. It is pushed away from the operator, and is especially useful on light soils, and for working among plants in beds and borders where it is inexpedient to tread.[1] The draw-hoe is also made in several widths, and is best with a curved or swan neck. This form is to be preferred for heavy work, and for earthing-up soil, etc. Some hoes have movable blades, allowing for different widths to be used with the same neck and handle. The drag or "cultivator" is another form of hoe with three prongs instead of a blade, and is useful for loosening the soil among growing crops. For thinning out Onions, Parsnips, etc., hoes or spuds with flat, narrow blades, 2–4 ins. wide, are procurable. The Canterbury hoe has two or three prongs, but is often double-headed, making a combination of drag and mattock. With the pronged side the soil can be loosened, weeds pulled up, etc.; the other side can be used for breaking down clods. Heart, or diamond-shaped hoes, are made for taking out drills, though this can also be done by working the draw-hoe sideways. Swan-necked hoes with short handles are useful for greenhouse stagings, window boxes, etc.

---

[1] The *Sproughton Hoe* will probably supersede the Dutch tool in the near future.—EDITOR.

In large plantations, where space permits, horse-drawn hoes or cultivators are often used. There are several modifications and combinations of hoe, fork, and spade, with three to five prongs, which are particularly useful where much work is to be done, or the soil is very heavy.

Knives.—These vary in shape according to the purpose for which they are designed. Budding knives have the blade straight, curved, or angular at the point, while the end of the handle is usually thin, round, and flattened, for raising the bark of the stock. Pruning knives have the blade sometimes straight, but more often curved forward, the better for cutting stout shoots. Propagating knives resemble thin-bladed budding knives.

Mattocks.—A form of pick having one end pointed, the other flattened and sharpened. It is useful for breaking up soil, cutting tree roots, and for other similar work. In the grubbing mattock the blades are shorter, and another pattern has both ends flattened, one being at right angles to the other.

Measuring Rods.—Strips of wood, $1\frac{1}{2} \times 1\frac{1}{2}$ ins. square, and 8–10 ft. long, marked off at regular distances, such as 6, 12, and 15 ins., to secure even planting in the rows.

Rakes.—For removing weeds and stones, fining and levelling the soil, and making a seed-bed, steel-toothed rakes give good results. The number of teeth varies from six to fourteen, and in the best types they are riveted to the bar. For lawns and paths, wooden-toothed rakes are best. They are broader, but lighter; and if strongly made are effective for most other purposes. Hay rakes, also of wood, usually have fourteen to seventeen teeth; Daisy rakes, used on lawns, have a number of teeth closely set.

Scissors.—Pruning scissors have one broad, flat blade, and another narrow and curved. Grape scissors, for thinning the berries, must be light, with thin, tapering blades.

Sécateurs.—Safer than pruning knives in inexperienced hands, though not used so much by expert gardeners. Made in several patterns, but mostly with curved or parrot-bill blades. The spring should be powerful, and a good tool should make a clean cut, not crushing the edges of the shoot.

Shears.—For pruning hedges these may have a notch at the base of the blade, for better cutting stout branches, but often the blades are quite straight-edged. This shape also serves for cutting lawns. For trimming grass edges the blades are straight, but at an obtuse angle to the handles, which also are longer; sometimes a small guide-wheel is fitted at the side. When using them, cut with top blade only. For low-growing trees, short-bladed shears with long handles are used.

Shovels.—Thinner and broader than spades, with the sides and head curving over. Being lighter, they are useful for loading barrows, gathering up crumbs of soil, etc.; but cannot take the place of a spade for digging.

Spades.—Invaluable for cultivating light soils, or those which are so heavy that they have to be cut up in digging. The blade should be straight, and there should be little curve from point to handle, so as to save labour in digging. Keep clean while using, and when putting it away, scrape off all soil and wipe with an oily rag. File the edge when it gets blunt.

Tree Pruner.—For pruning standard trees and tall branches. One blade is fixed to a long rod; the other is free, and is operated by a lever, the handle held by the operator. This is sometimes called an Averuncator.

Trowels.—The blade is of iron or steel, and should not be too cupped, or it is apt to clog in stiff soil. A broader form is made for lifting and planting bulbs. Fern trowels have longer and narrower blades.

Turf Beater.—A flat, oblong piece of wood, with a handle fixed at an acute angle. It should be fairly heavy, and is used for beating down turf, firming soil, etc.

Turf Cutters.—Either heart or crescent-shaped, with a curved handle. Used for lifting turf, which should first be cut into strips with the edging knife.—W. J. C. [Some miscellaneous tools with which the gardener should be provided include the following: axes, chisels (for wood and stone work), crowbar, garden ruler, garden pencils (indelible), glass cutter, hammers of various sizes, hatchets, mallet, mops, mortar trowel (for pointing buildings), pickaxe (to supplement mattock), putty knife, saws of various sizes, scythe, and scythe-stone, soldering iron (for repairing leaking water cans), and whetstones. For water-cans, lawn-mowers, and other similar "tools," see article on *GARDEN APPLIANCES*.—EDITOR.]

GARDEN VASES.—See VASES in *GARDEN FURNITURE*.

GARDEN WALLS.

For the production of perfectly ripened high-class fruits, walls are necessary, and brick is to be preferred, being porous, absorbing and retaining the sun's rays. Walls may vary in height, from 8–14 ft., or even 16 ft.; up to 10 ft. they may be 9 ins. thick, but over 10 ft. must be 14 ins. in thickness. Fourteen feet may be considered high enough for the development of the trees, as well as for conveniently training the branches and gathering the fruit. A coping of stone, or cement blocks 3 ins. thick and projecting 3–3½ ins., with a drip groove close to the edge, adds to the usefulness and appearance of the wall; and brackets should be built into the face of the wall on which to place temporary 9-inch coping-boards fitting close under the stone coping, to protect the blossom from spring frosts. Nails or hooks may be fixed into the boards from which to suspend mats or other protecting material.

Supposing the ground to be enclosed is an acre in extent, it is better where possible to form a "parallelogram" rather than a square, owing to the fact that a South wall is very much more valuable than is one facing East. A North wall too is more valuable than one facing East or West, for North Borders (see article on this subject) are then possible. So where circumstances permit, make the lengths of the North and South walls half as long again as the walls facing East and West, *i.e.* 3 : 2. This "parallelogram" form is much more pleasing to the eye than is a solid square.

For a garden of an acre the North wall may be 14 ft. high, the East and West walls 12 ft., and the South wall 10 ft., that is if the ground is nearly level, but on a gentle slope the breakings may be a foot less.

The South side of the North wall should face the sun about noon; in the warm parts of the country it may incline to the East, facing the sun at eleven o'clock. In colder climates, where Peaches do not ripen to perfection, it may incline to the West, facing the sun at one o'clock, the sun having greater power in the afternoon; thus the fruit will receive the maximum degree of heat.

Walls may easily be wired. This is a great improvement on the old system of shreds and nails, and a saving to the wall. Galvanised wire strained horizontally along the face of the wall is the best material, though some say it should be painted. For Peaches and Nectarines, the wires should be 4 ins. apart, and ¼–½ in. from the face of the wall; this distance does not in any way detract from the benefit the trees may derive from being in close contact with the wall, as it may be an advantage to have a circulation of air between the wall and the branches, thus promoting the ripening process. For Apricots, Cherries, and Plums the wires may be 6–8 ins. apart, and 1 ft. for Pears. Wire No. 13 or 14 gauge is most suitable, and this can easily be tightened by raidisseurs.

Some object to the use of any form of wire, maintaining that the shoots of the trees coming in contact with it is a cause of canker; but in miles of wire we have never found a diseased shoot. To counteract the likelihood of any ill effects, a coating of paint could be applied.—W. L.

[Although Garden Walls find their chief value as a means of assisting the growth of trained fruit trees, and of giving these the necessary protection, some other uses for walls must not be overlooked.

A wall may be built to hide an ugly patch of the garden or adjacent land, and up this Virginian Creeper and other climbing plants may be grown. (See *CLIMBING AND TRAILING PLANTS*.)

It may be thought that this is an expensive way of serving the purpose, and that a hedge or small plantation of trees would be better. Yes, when the gardener or his employer has the patience to wait for them to grow. But where it is desired speedily to conceal a blot in the landscape, such as ironworks a short distance away, rubbish tips, etc., or even a busy high road, the only way to do is to build a wall and clothe it with creepers.

The idea that walls are blots on the garden pictures is untrue. Some walls are very ugly indeed, but none need be. If they are built of less carefully trimmed stone they will be both cheap and effective; climbers or creepers will love them, and cling to the pores of the stone straight away. Red sandstone and brick walls, or those made of artificial stone, are unsuitable for the ornamental parts of the garden, as also are walls built of crystalline rock, such as granite or the various kinds of spar. These may be very suitable for the kitchen garden, though the red sandstone, if used, should have first been proved to be durable.

There is yet another kind of wall—the *rock wall*, used more for supporting higher portions of the garden than for any other purpose. Here again crystalline rock and artificial stone must be banned; good rough pieces of limestone built so as to slope slightly inwards, without the least bit of mortar, form the best walls, and all manner of entrancing rock plants will revel in the niches between the rocks.

Just a word in conclusion about building walls to follow on what our contributor has already said. First of all, get out a good foundation, for you cannot expect to build anything that will stand unless you start well. One yard deep and 2 ft. wide is none too much for a 14-inch wall; but, of course, a greater depth and width must be allowed for a higher ornamental wall. The foundation should be of rough stone well stuck together with good mortar, in which a bucket of cement has been added to every barrowful. Start from the first with a straight line and keep strictly to this. Put on a good layer of mortar, then the bricks, tapping each well down with the mortar trowel. Pass the edge of the trowel along the face of the bricks or stones to remove mortar which has exuded from between when the stones or bricks were firmed. As the wall grows in height keep testing it with a plumb-line to see you are building it perpendicularly—not an easy thing to do for a beginner. When it comes to the coping, put an extra good layer of mortar on to keep the blocks very firm. After building, go over the wall and thoroughly "point" all the joints. For ornamental walls mortar is better than cement for this pointing, as creepers cling to it more readily.—EDITOR.]

GARDEN WEIGHTS AND MEASURES. See *WEIGHTS AND MEASURES.*

GARDENERS: TRAINING OF. — See *TRAINING OF GARDENERS.*

GARDENIA (Nat. Ord. Rubiaceæ). This is a greenhouse flowering shrub, growing 2–5 ft. in height, and offering a considerable range in the colour of the flowers. Pot culture is usually adopted, a good rooting medium being old turfy loam, two parts; decayed leaves and peat, half a part each, with a little old mushroom-bed manure, and some coarse sand to keep the whole open. Propagation is best effected by cuttings.

Culture.—Cuttings are best taken in January and require a brisk heat for rooting, say 75° F., the young plants being potted singly, and grown on in a temperature of about 70° F., using the syringe freely to keep down insect pests. Pinch the young shoots to induce a bushy habit of growth, and finally transfer into 8-inch pots as soon as required.

USES.—These plants are largely used for house or table decoration, and the flowers are popular for button-hole purposes. As the different species bloom at various seasons, a long period of flowering may be secured. If grown annually from cuttings, and flowered in 5- or 6-inch pots, the plants remain dwarf and bloom better than older and taller specimens.

Varieties.—The best are florida fortuneana, florida radicans major, rihida, and Thunbergia.—J. L. G.

GARDENING ARITHMETIC. — See *ARITHMETIC AND GARDENING.*

GARDENING AND EDUCATION.—See *EDUCATION AND GARDENING.*

GARDENING AND SCHOOLS.—See *SCHOOL GARDENING* and *SCHOOL GARDENS.*

GARDENING AND SNOW.—See *SNOW AND GARDENING.*

GARDENING FOR THE VERIEST AMATEUR. — "My goodness, that'll never grow anything!" How many times have I heard the rawest of raw amateurs say that when they surveyed the weed-covered, old tin-besmothered yellow clayey patch that their enthusiastic landlord has optimistically described to them as a "nice little garden"?

And how many times, a year or so later, have I joined the same amateurs, now no longer raw, in a song of praise for the dainty show of flowers, the healthy plot of vegetables, that have replaced the weeds and tin cans in that same garden?

Times without number.

So that my first words of advice to the veriest amateur are: Don't be discouraged by appearances. Get right down to the work, whether you know how to tackle it or not. Experience will very soon teach you the *right* thing to do. And you just can't make any mistakes that matter, at the outset.

Start by pulling up the weeds, by the roots if possible, and picking up the sticks, the larger stones, old tins and rubbish of all sorts; throw them all into a corner and set light to anything that is burnable. Save the ashes. They are useful as manure.

Then sit down with a pencil and a piece of paper and rough out your ideas of what you want your garden to be like—a curly path round the garden, an oval patch of lawn here, two diamond-shaped beds there, a vegetable plot, nicely get-at-able, in the sunniest place, and so on.

Don't be too ambitious in your ideas if you have only a small plot.

You can develop later when you gain experience. And don't bother about what you are going to grow at this stage.

Armed with your plan and a strong, bright spade, not too heavy, next tackle the digging. It is backaching work, but it is splendid exercise, and it is just wonderful how quickly you get used to it.

Your soil will probably be very heavy clay, or very chalky, or gravelly. But anyway, try to loosen it as much as you can with spade or fork. Many a flower and vegetable root will be venturing down there later on in search of nourishment.

In digging, first take out a trench along the whole width of the plot. Your next step, if you can beg, borrow, or steal some manure, is to put a layer of it in the trench you have just dug. In the absence of manure, use any decayed vegetable matter you can get. Then right alongside this trench, dig another trench, throwing the soil forward to fill the first trench.

The soil from the third trench fills the second trench, and so you go over the whole plot, the soil you took from the first trench, and which you should have put aside, filling the last trench dug. Don't forget to stir the bottom soil in each trench, and remember that digging is easiest on a fine day following a spell of rain.

The beds for both flowers and vegetables should be dug in this way, and then at least you will have laid the foundations for a good show.

After thoroughly raking and breaking the surface soil everything is now ready for seed sowing.

Except during winter or late autumn there is always something worth sowing either for use or decoration, but if you can manage to have your plot ready by the spring so much the better.

Vegetables to Grow.—The following is a first-class selection of easily grown food-crops, herbs, and saladings, to start with, in which a really good variety of each is suggested, and the chief cultural points are given.

BEANS.—Have a row of runners along your fence or wall. They are both decorative and useful. French Beans take up a lot of room and are not so prolific. *Hackwood Park* is a good variety. Sow seed in May 3 ins. deep and 8 ins. apart. One pint will sow 30 yds. Commence picking in July.

BEET.—*Crimson Globe* is the best sort. Sow in April thinly in drills 15 ins. apart and 1½ ins. deep. Thin out to 6 ins. apart. One ounce will sow 50 ft. of drill. Ready from September onwards.

BROCCOLI, BRUSSELS SPROUTS, and CABBAGE.—It is best to buy plants of these winter vegetables in June and plant them on good ground which has been growing other vegetables, in rows 2 ft. apart each way.

CARROT.—*Model,* a stump-rooted sort, is splendid. Sow in March, April, and May, very thinly in drills 12 ins. apart and 1 in. deep. Thin out to 4 ins. One ounce will sow a row of 50 yds. Ready from July onwards.

LETTUCE.—*All the Year Round* is the best sort. Sow weekly from February to August in drills ½ in. deep and 12 ins. apart. Thin out to 6 ins. apart. A pinch of seed gives dozens of plants. Ready all summer and autumn.

MINT.—Buy a small root in spring and plant in any out-of-the-way corner. It will soon spread.

ONIONS.—*Ailsa Craig* or *Brown Globe* are unrivalled. Sow in February very thinly in drills 1 in. deep and 12 ins. apart. Thin out to 6 ins. One ounce will sow 50 yds. of row. Ready in September.

PARSLEY. — Sow in March the *Moss Curled* variety in drills ½ in. deep and 15 ins. apart. Thin out to 6 ins. apart. Only a pinch of seed is needed in the average garden.

PARSNIP.—*Student* is quite the best. Sow in February thinly in drills 1 in. deep, and 15 ins. apart. Thin out to 6 ins. apart. One ounce will sow a row of 60 yds. Ready in November.

PEA.—*Gradus*, *Little Marvel*, or *Senator* are splendid. Sow in March, April, or May, at fortnightly intervals to keep up supply, in drills 3 ins. deep and 4 ft. apart. One pint will sow a row 30 yds. long. Ready from July onwards.

POTATOES.—It doesn't pay to grow potatoes in a small garden; their place is in larger allotments. If you are keen on a few rows, *May Queen* or *Sharpe's Express* are good sorts. Plant in April 4 ins. deep and 10 ins. apart, in rows 20 ins. apart.

RADISH.—*French Breakfast* is quite unrivalled. Scatter a pinch of seed weekly in an odd corner (shady in summer), covering with fine soil.

SPINACH.—*Round Leaved* or *Perpetual* will give good returns. Sow weekly from April to September in drills 2 ins. deep and 12 ins. apart. Ready all the year round.

TOMATO.—Buy half a dozen young plants in April, and give them the sunniest possible position. Ready from July onwards.

TURNIP.—*Snowball* is a splendid sort. Sow weekly from April to July in drills ½ in. deep and 12 ins. apart. Thin out to 6 ins. apart. One ounce will sow a row of 40 yds. Ready continuously from June to March.

VEGETABLE MARROW.—Buy a couple of plants in May and plant out on a heap of good soil on your rubbish heap, to give you fruit continuously from August onwards.

Flowers.—Concerning these the first question is:—What flowers to set. This is somewhat a matter of your own choice—and pocket. A few rose bushes, of course, are indispensable, but, personally, I should be content for the first year or so to depend on hardy annuals (seeds of which are sown and bloom the same year) backed up by a few perennials (which, once planted, continue to come up year after year). Geraniums, Lobelia, Marguerites, and the other flower-bed schemes are all very well in their way, but they don't allow one to work on the cut-and-come-again principle that most amateurs desire, and are expensive to buy. Roses and herbaceous plants are quite easy to grow, thriving in any good, rich, well-dug soil.

ROSES.—A good selection of dwarf roses can be made from the following: *Caroline Testout* (salmon pink); *Frau Karl Druschki* (white); *George Dickson* (deep crimson); *General McArthur* (scarlet); *General Jacqueminot* (crimson); *La Tosca* (salmon); *Mme Ed. Herriot* (prawn red); *Mme Melanie Soupert* (golden-yellow); *Mme Ravary* (orange-yellow); *Mrs John Laing* (rose-pink); and *Ulrich Brunner* (cherry red).

Among rambler roses for covering ugly walls or forming archways, a good selection is: *Alberic Barbier* (white and yellow); *Crimson Rambler* (fine crimson); and *Dorothy Perkins* (pink).

USEFUL ANNUALS.—Now for the other flowers. You want to realise your ambition of a garden beautiful and at the same time flowers to cut for the vases in the house are wanted. The following hardy annuals are just splendid for both purposes:

Alyssum (white and yellow); Calendula (orange); Candytuft (crimson, lilac, carmine, and white); Clarkia (white, rose, crimson, salmon, and violet); Coreopsis (crimson and yellow); Eschscholzia (any variety); Larkspur (any variety); Love-in-a-Mist (blue and white); Lupine (blue, white, rose, and yellow); Mignonette (various); Nasturtium (dwarf, in brown, yellow, and red); Poppy (various); Statice (bright rose); Sweet Pea (various lovely shades); and Sweet Sultan (blue, carmine, and white.)

All of these are the simplest things in the world to grow, provided you sow very thinly, thin them out well, giving them plenty of room to grow, water them well when it is dry, and keep weeds at bay. Full directions are given in other articles, so that it is only necessary to say here that all of them may be sown in March or April in tiny drills, drawn with a stick. The seed is afterwards covered in with fine soil, and birds kept off with black cotton.

Pleasing Perennials.—Finally there are the perennials which should have a place at the back of every flower border. Here is a selection, all good for cutting and of fine effect; each one of them being able almost to grow itself: Campanulas (blue and white); Canterbury Bells (various); Chrysanthemums (single, white); Delphiniums (white, blue, and red); Evening Primroses (yellow); Hollyhocks (yellow, pink, white, purple, and red); Michaelmas Daisies (various blue shades); Pyrethrums (various red shades); and Sunflowers (yellow).

The best way to start off with these flowers is to buy plants in March and April. Planted firmly, in well-dug soil, they will give no trouble for years, unless you wish to have more of them, when, in many cases, the roots may be taken up in the spring and divided.

For a show of flowers in the spring, faith should be pinned to bulbs, the commoner varieties of which are inexpensive and exceedingly lovely. The time for them to be planted is in the autumn as soon as the summer flowers are over. When they have finished flowering in the spring they should be lifted and buried in the soil in any odd corner until the foliage has died down and turned brown, when they are lifted again and stored indoors.

Now, there is your scheme. It isn't so difficult, is it? And think of your pride when you take your friends round the garden when it is in its glory, and can say, "Alone I did it!"—W. Bt.

GARDENING IN CELLARS. — See *CELLAR GARDENING.*

GARDENING IN IRELAND. — See *IRISH GARDENING.*

GARDENING IN TUBS.—See *TUB GARDENING.*

GARDENING LAW.

There are several points in reference to Gardening Law which it is advisable for the gardener to bear in mind, and I propose to try and profitably direct his attention to one or two important subjects connected therewith.

Allotment Gardener's Agreements.—First I should like to refer to the Agreements made with Allotment Gardeners. In those Agreements it is usual to stipulate that the tenants shall have the right during the tenancy, subject to the approval of the Local Authority's Surveyor, to erect greenhouses and other buildings, etc., on the premises, and shall be entitled on the expiration of the tenancy to remove all such greenhouses, buildings, etc., and also all fruit trees, bushes plants, roots, and vegetables planted or laid down by the tenant in and upon the premises; and that all greenhouses, erections, trees, plants, and vegetables not removed within one calendar month after the expiration of the tenancy shall be deemed to have become the absolute property of the Local Authority.[1]

Alteration of Character of Garden.—You must not alter the character of the garden without obtaining permission of your landlord. For instance, you must not plant large trees in front of a house so as to alter the view or diminish the light, or turn a grassy lawn into a flower garden, or a flower garden into a lawn. The complexion or character of the garden is a matter for the owner, and no one else has a right to alter that complexion. But if the alteration is in respect to cutting down, grubbing, or transplanting, pruning trees or hedges, and this tends to improve the property, this is allowable; but the gardener must not destroy one kind of hedge and plant another without permission.

Compensation for Improvements.—It is well to bear in mind that you cannot compel the landlord to give you any compensation for fixtures which you have put up and are unable to take away. If, for instance, the tenant has erected a valuable little structure, such as a conservatory let into the ground, he cannot claim any compensation from the landlord for the improvement he has made. It cannot be too well borne in mind that if you make improvements to the premises of which you are a tenant, you make them for the benefit of the owner of the premises. I mention this because it is not unusual to hear of people trying to get compensation for such things from their landlords, and they have been astonished to learn that their claims were without foundation and could not be supported in law.

By-Laws *re* Structures.—If you want to add to the convenience of your garden by building a shed, conservatory, or anything else of considerable value, it is well to inquire into the local by-laws first of all, and the safe thing to do after this is not to fix your structure into the ground or to any other building. Let it simply rest on the ground and be kept in position by its own weight, taking care to construct it in such a way that it is heavy enough not to be easily knocked down or blown out of position. Then you will be quite independent of your landlord's goodwill, for if the structure, of whatever kind it may be, is not fixed to the premises, no one can possibly contend that it has become the landlord's property.

Fixtures of Tenants.—I should like to point out the position of the ordinary gardener as regards fixtures. He may often wish to put up a more permanent shed, greenhouse, or some other kind of structure. In this case it is advisable to enter into an agreement with the landlord as to its removal at the end of the tenancy. If no agreement is entered into, the tenant should be extra careful how he builds it, for if in removing it he damages the landlord's property, the landlord can refuse to let him take it away.

The law on this point is, that anything affixed in such a way that you have to break or damage any part of the landlord's property becomes a landlord's, and not a tenant's, fixture. If it is simply fixed into the brick or woodwork with a screw or two, it will be a tenant's fixture.

Generally speaking, anything which a tenant can lift up or unscrew remains his property and can be carried away by him. But if he has to dig up the ground, chip out any mortar, or break anything in order to separate it from the land or building, he must leave it alone, for it belongs to the landlord.

Fixtures: Sale of, by Tenants.—A point worth noting is, that when your tenancy is up and you leave your garden, you should take all the tenant's fixtures with you. If you do not, they become the property of the landlord.

Should you leave any fixtures on the chance of the next tenant buying them, you stand a very good chance of losing your property. As a matter of law, you lose it directly you leave the premises. It has all become the landlord's property, and you cannot sell it to the new tenant because it is not yours to sell. If you think the fixtures are likely to be bought by an incoming tenant, either make your bargain with him before your agreement expires, or else ask the landlord's permission to leave them on the premises.

Notice to Quit.—In the case of a

---

[1] It is well to note that Allotment Gardeners who have private land to cultivate, *i.e.* do not hold their plots from the City Corporations, are not entitled to compensation for ejection, and have no legal redress no matter for what reason their tenancy is terminated.—EDITOR.

yearly tenancy, an ordinary tenant is subject to removal at six months' notice, expiring on the same date at which the tenancy began.

The English Agricultural Holdings Act altered the six months to a year in the case of agricultural tenancies, but the Agreement with Allotment Gardeners previously referred to usually expressly defines the period and expressly excludes the operation of the Agricultural Holdings Act.

Private Gardens : Garden Societies.—Where the premises are let solely for the purpose of private gardens or for the benefit and enjoyment of a Garden Society, the same are usually agreed to be deemed not to be a holding within the meaning of the Agricultural Holdings (England) Act, 1883, the Tenants' Compensation Act, 1890, and the Market Gardeners' Compensation Act, 1895, or any of them, and the operation of such Acts in relation to compensation for improvements, is therefore expressly excluded.

Plants or Trees not Removable.—Another important point is, as to the right to remove trees or plants. It is well in this connection to know that at the end of the tenancy in the absence of agreement all the trees and plants in the garden must be left there. Whenever a tenant puts a tree, plant, or shrub in the ground it becomes the absolute property of the landlord as soon as it takes root.

Cutting of Trees.—It is good law that if my neighbour has something on his land which causes a nuisance to me I am justified in going to his land and abating the nuisance myself. But first I must give him notice to abate it himself. So if the branches of the tree of a neighbour spread out over the fence into your garden, you can saw them off level with the fence, because you are entitled to abate a nuisance, and only need to give notice if you want to go on your neighbour's land to abate the nuisance. So long as you keep on your own ground you can do it yourself without any warning.

Right to Prune Hedges.—The tenant has the right to prune hedges, as this is for the improvement of the property.

Trespass by Neighbour's Fowls, etc.—This is a matter of common occurrence. If your neighbour's fowls do damage to your garden you can drive the fowls, etc., away, and bring an action for damages for the value of the crops destroyed and for the trespass, and you can also take the law into your own hands to a certain extent by capturing the fowls found committing damage and keeping them until the owner pays for the injury they have done. While you hold them in durance vile you must give them sufficient food and water, but you are entitled to keep anything produced by them. For instance, if you capture a hen and it lays an egg during its captivity, you are entitled to the egg. But you must not shoot or otherwise destroy your neighbour's live stock except in self-defence, as, for instance, a dog that attempts to bite you.

Law as to Nuisances.—As regards nuisances it may be well to point out that the ordinary law applies, and that the gardener must not do anything which will be an annoyance or nuisance to his neighbour without obtaining that neighbour's consent. So that gardeners should bear in mind that they may be obliged to stop a garden fire pouring out dense volumes of smoke and to remove smelly rubbish or manure heaps. Also they cannot use night soil, sewage, pond mud, pigsty refuse, or other very offensive, smelly material if the same is a nuisance to the neighbours, and they could be stopped from so doing by injunction.

Law as to Traps or Poison.—It is a criminal misdemeanour to set traps or lay poison in your garden, and if harm comes of it you are guilty of an inhuman act, and are liable to yield redress to the sufferer or, in the case of an animal, to the owner of the creature you have destroyed or otherwise injured.—J. C. A.

GARDENING LITERATURE. — See *LITERATURE OF THE GARDEN.*

GARLAND FLOWER.—A name sometimes applied to various species of DAPHNE, which see in *DAPHNE* and *SHRUBS.*

GARLIC (*Allium sativum.* Nat. Ord. Liliaceæ).—Considering the many uses to which well-grown bulbs or cloves of Garlic may be put by good chefs and cooks, it is a matter for surprise that one rarely sees this grown in our home gardens, the bulk of that offered for sale by grocers and others being imported from abroad. Yet it is a fact that profitable returns are assured from plantings made in this country, upon all save perhaps the most uncongenial soils. As substitutes for onions, these deserve a wider recognition, and for this purpose may well receive attention from those who find the cultivation of the latter somewhat difficult, or in those districts much troubled by the Onion Fly.

Culture.—A supply of "cloves" should be purchased as early in the winter as possible, and these allowed to stand in a frost-proof place, on a cool bottom, until February when, providing conditions are favourable, they may be planted in the open garden, after which little or no trouble need be taken. A good open position is of more importance than a heavily manured soil, in fact any soil well manured for a previous crop may be relied upon to give a satisfactory crop of Garlic.

A foot between the rows, and 9 ins. between the sets, is the distance usually allowed, but where no manure has been added, 3 ins. less each way will be a fair distance. Either press the cloves well into the soil with the hand, or plant with a trowel or dibber, burying each with 2 ins. of soil.

The crop usually reaches maturity in early July. When the tops die down, lift carefully with a small fork, and after a few days' thorough baking in hot sun, remove to a shed or store in bags for later use.

F. R. C.

GARLIC MUSTARD.—See *SISYMBRIUM.*

GARRYA.—For the best species see *CLIMBING AND TRAILING PLANTS* and *SHRUBS.*

GAS LIQUOR.—See *AMMONIACAL LIQUOR.*

GAS TAR WATER.—See *AMMONIACAL LIQUOR.*

GASLIME.—See *SOIL FUMIGATING.*

GASTRIDIUM (**NIT GRASS. Nat.** Ord. Gramineæ).—This is a small genus of hardy ornamental grasses of very easy culture. The best known species is *G. australe* (Syn. *G. lendigerum*), which grows about 12 ins. high.

GATES.—See *GARDEN GATES.*

GATHERING FLOWERS.—See *FLOWER GATHERING.*

GATHERING LEAVES.—See *LEAVES: GATHERING, STORING, AND USING.*

GATHERING RHUBARB.—See *RHUBARB.*

GATHERING AND STORING FRUIT.—This is a matter of very great importance, since, if fruit is carelessly gathered and haphazardly stored, much waste of good food results.

Gathering.—APPLES AND PEARS.—Careless picking results in bruising, and bruised fruits can neither be stored satisfactorily nor do they command the highest prices.

Early varieties can be picked as soon as they are of marketable size, and for this reason it takes three or four successive pickings to clear the trees.

Fruit for keeping must be ripe before it is gathered or it shrivels when stored. Varieties in season in October and November should be picked first, while late keepers must be left on the trees as long as possible to gain in weight, even though a few drop and can only be sold or used as windfalls.

Ripe fruit is easily distinguished from unripe. The seeds of the former are quite brown and any specimen can be removed from the tree by raising gently with the hand, whereas unripe fruit have to be sharply pulled away.

To prevent bruising when gathering, use either picking baskets padded with sacking or picking aprons. Place each fruit gently in the receptacle—never throw or drop them in. Again, empty the fruit carefully into the storing boxes or baskets, and do not turn them out roughly. Of course, the best plan is to pick direct into the storage boxes or baskets.

STONE AND SOFT FRUITS.—These should be gathered before they are dead ripe, otherwise they will not travel satisfactorily.

Storing.—Successful storage depends firstly on the care with which the fruit have been handled during picking, and secondly on the suitability of the store.

For the fruit to keep satisfactorily, the storeroom must be—

(1) Well ventilated.

(2) Of an even, low, moist temperature, that between 40–50° Fahr. being the best.

(3) Frost-proof.

(4) Dark.

A cool cellar or any other brick or stone building can be used, but the best store of all is partly underground, with an earthen floor and a thatched roof.

Wooden buildings with corrugated iron roofs are bad, as the temperature cannot be maintained at an even level. Very dry buildings are bad, as the fruit is then inclined to shrivel.

The fruit keeps best when stored in boxes or baskets of about 1 bushel capacity. These may be stacked in tiers so that the space between each layer of fruit allows free circulation of air.

The next best method is to cover the floor and line the sides of the building with about 6 ins. of clean straw (wheat straw for preference), and then store the apples in a heap, 2–3 ft. deep. The straw allows good air circulation round the heap, and keeps it at an even temperature. It also prevents bruising and checks sweating.

Choice Pears should not, however, be stored in heaps, but in shallow boxes or spread out upon shelves or wooden racks. They must be watched carefully, for when once ripe they soon become overripe.

Grapes are often kept in a special store fitted up to hold numbers of bottles containing water, which are inclined at an angle of about 35 degrees towards the centre of the room. When gathering grapes a portion of the vine to which the bunch is attached is cut off on either side of the bunch. One end of the vine is then inserted into the neck of the bottle so that it reaches the water, and in this way some of the late varieties, such as *Lady Downe's Seedling*, will keep right round the year until the new crop is ready to pick.

The keeping quality of fruit even of the same variety differs greatly according to the district in which it is grown, the nature of the soil, the kind of stock on which the tree is grafted, besides the weather conditions during growth and ripening. For instance, apples and pears grafted upon free stocks keep better than those upon crab or quince; fruit grown on light soils, though ripening earlier, does not as a rule keep so well as that on clay soils, and that from grass orchards often keeps better than that from cultivated land. With regard to this point, it does not follow that grass orchards are necessarily to be preferred to cultivated plantations, and it is a well known fact that young trees should not be planted in grass.—R. W.

[For further information on Fruit Storing attention is drawn to our article on *FRUIT ROOMS AND FRUIT HOUSES*.—EDITOR.]

GAULTHERIA (Nat. Ord. Ericaceæ).

A genus of dwarf-growing shrubby rock plants, suitable for a shady position. They are propagated by means of seeds sown in a little heat in March. Only two species are worthy of commendation:—

Gaultheria nummularioides.—This has prostrate stems, and evergreen foliage. Flowers small. Site shady. Soil peat. Flowering Period, June to August. Height, 3 ins.

G. procumbens.[1]—An evergreen tufted plant with bronzy leaves. Flowers small, succeeded by attractive berries. Site, half-shade. Soil peat. Flowering Period, July to August. Height, 6 ins.

See also under WINTERGREEN in *MEDICINAL HERBS*, and *SHRUBS*.

GAURA (Nat. Ord. Onagraceæ).

This is a genus of hardy annuals or perennials of easy culture which are best treated as hardy or half-hardy annuals, either sowing outside in an open border in April, or under glass in heat in early March, and planting out later. *G. Lindheimeri* is the species most usually grown. This bears pretty rosy-coloured flowers from June to September, and grows about 1 yd. in height.

GAYA.—Now included in the genus *LIGUSTICUM*.

GAZANIA (TREASURE FLOWER. Nat. Ord. Compositæ).—This is an extremely showy free flowering plant for the greenhouse, or for hot sunny borders in summer. It is propagated by cuttings of side shoots in March and August, inserted in sandy soil under a handlight or frame, and should be potted in turfy loam, leaf-mould, and sand. Temperature required, 40–50° F.

Greenhouse Species.—*Gazania Pavonia.*—Yellow. Flowers in July. Height, 1 ft.

G. rigens.—Orange. Flowers in June. Height, 1 ft.

G. splendens.—Orange, black, white. Flowers from June to September. Height, 1 ft.

G. uniflora.—Yellow. Flowers in July. Height, 1 ft.

GEAN (*Prunus Avium*).—See *TREES*.

GENERAL MANURES.—See *MANURES*.

GENISTA.—For the best species see *SHRUBS*.

GENTIAN.—See *GENTIANA* and *MEDICINAL HERBS*.

GENTIAN RUST.—See *DISEASES OF ROCK PLANTS*.

GENTIANA (GENTIAN. Nat. Ord. Gentianaceæ).—A most valuable and beautiful family of rock garden plants. They nearly all thrive in well-drained soil with plenty of moisture in summer, and are propagated by division of the roots in autumn or spring. Most species are also easily raised from seeds sown in gentle heat in March.

What to Grow.—The best are briefly described below:—

Gentiana acaulis (GENTIANELLA).—This has closely tufted stems and dark green leaves. Flowers rich blue, with yellowish mark inside tube. Site sunny. Soil rich gritty loam. Flowering Period, March to May. Height, 3 ins. There are several varieties of this, including a pure white one—*alba*.

G. Andrewsii.—A tall growing sort with tufted stems. Flowers rich blue, in terminal clusters. Site, half-shade. Soil rich loam. Flowering Period, July to September. Height, 1 ft.

G. asclepiadea (WILLOW GENTIAN).—A tall sort with leafy stems. Flowers rich purple, in long spikes. Site shady. Soil rocky sandy loam. Flowering Period, June to July. Height, 2 ft. The variety *alba* has white flowers.

G. dahurica (Syn. *G. Przewalskii*).—A sort with procumbent stems growing from rosette of long leaves

---

[1] The CREEPING WINTERGREEN.—EDITOR.

Flowers light blue, tinged with purple. Site, half-shade. Soil sandy loam. A biennial flowering in June and July. Height, 6 ins.

G. Kurroo.—Similar in habit to above. Flowers azure blue, spotted with white towards the base. Site, half-shade. Soil sandy loam. A biennial flowering in August and September. Height, 4 ins.

G. lagodechiana.—This has tufted leafy stems and purple-blue flowers spotted with pale green. Site, half-shade. Soil loam. Flowering Period, June to July. Height, 4 ins.

G. lutea[1] (YELLOW GENTIAN).—This has tall stout stems with large leaves. Flowers yellow, in whorls. Site, open. Soil stiff loam. Flowering Period, July to August. Height, 4 ft.

G. Pneumonanthe (CALATHIAN VIOLET).—Stems slender. Flowers deep blue. Site sunny. Soil boggy peat. Flowering Period, July to August. Height, 9 ins.

G. septemfida.—This has tufted leafy stems and bright blue flowers in large terminal clusters. Site, half-shade. Soil sandy loam. Flowering Period, June to August. Height, 1 ft.

G. sino-ornata.—A low growing tufted plant with narrow leaves. Flowers bright blue, large, and freely produced. Site, half-shade. Soil rich gritty loam and peat. Flowering Period, September to November. Height, 6 ins.

G. verna.—A small tufted plant. Flowers deep blue, with white fringed eye. Site, half-shade. Soil sandy, gritty loam and peat, but plenty of moisture. Flowering Period, April to May. Height, 3 ins.

G. verna alba.—Flowers pure white.

There are many other species suitable for the rock garden, but owing to restricted space are not included in the above list, which contains, however, the cream of those cultivated.—W. I.

UP-TO-DATE SELECTIONS.

Gentiana hexaphylla.—Blue, marked yellow.

G. lagodechiana Hascombe.—Blue, white spots.

G. Macaulayi Wells.—A most useful kind.

G. ornata.—Blue.

G. prolata.—Bright blue, tube paler.

See also GENTIAN in *MEDICINAL HERBS.*

GENTIANELLA (*Gentiana acaulis*).—See *GENTIANA.*

GEOLOGY.—See *GARDEN GEOLOGY.*

GEOLOGY, DRIFT.—See DRIFT GEOLOGY in *GARDEN GEOLOGY.*

GEONOMA.—For the best species see *PALMS.*

GEOPHILUS.—See under CENTIPEDES in *INSECT PESTS.*

GERANIUM (CRANES-BILL. Nat. Ord. Geraniaceæ).—A genus of border and rock plants. All the smaller kinds are suitable for the rock garden. They require well-drained soil in sunny positions, and are propagated by division of roots in autumn or spring, also by seeds sown in spring.

Perennial Border Species.—The best are given below:—

Geranium aconitifolium. — Syn. *G. rivulare*, which see.

G. anemonaefolium (Syn. *G. Lowii*).—This is a pink summer blooming geranium, 18–24 ins. high.

G. armenum.—A strong growing species bearing blood-red flowers from May to August. Height, 2 ft.

G. dahuricum.—A useful rich purple flowered species blooming in July. Height about 18 ins.

G. Endressii.— A rose-coloured species flowering from late June to the middle of September. Height about 12–15 ins.

---

[1] The BITTERWORT of some authorities.—EDITOR.

G. grandiflorum.—A sort with large blue or violet-blue flowers produced in the summer. Height, 12–18 ins.

G. Lowii. — Syn. *G. anemonaefolium,* which see.

G. macrorhizum.—Red or rose-purple flowers of this are produced freely in June and July. Height, 18 ins.

G. malvaeflorum (Syn. *G. atlanticum*). — This large-flowered sort is not perfectly hardy. It bears purple flowers in the early summer, and its height is 12–18 ins.

G. pratense.—There are many varieties of this blue perennial; for instance, *G. p. flore albo* (white), *G. p. flore pleno* (double), etc. There is also a mauve sort which is useful. The flowering period ranges from June to August, and the height from 18–24 ins.

G. rivulare (Syn. *G. aconitifolium*). — This bears white flowers in June, and averages 12–24 ins. in height.

G. sylvaticum.—The double sort (*G. s. flore pleno*) is the best. The colour is hard to define, but is a kind of purple-blue, with veins of crimson. The plant blooms in May and June, sometimes continuing for a long period. Its height is about 18 ins.

G. tuberosum.—Of this there are pink and purple varieties. The plant blooms from May onwards, and is about 18 ins. high.

Rock Garden Species.—The best are those named below:—

Geranium argenteum.—A choice alpine plant. Leaves silvery-white in tufts. Flowers rose-pink. Site sunny. Soil gritty loam. Flowering Period, May to August. Height, 4 ins.

G. cinereum.—Tufted plants with silvery leaves. Flowers reddish-purple. Site sunny. Soil gritty. Flowering Period, May to August. Height, 4 ins.

G. ibericum.—A showy plant with large leaves. Flowers blue. Site open. Soil loam. Flowering Period, June to September. Height, 1 ft.

G. lancastriense.—See *G. sanguineum* var. *lancastriense.*

G. sanguineum. — A handsome prostrate plant. Flowers crimson-purple. Site open. Soil stony. Flowering Period, May to September. Height, 6 ins.

G. sanguineum album.—Flowers pure white.

G. sanguineum var. *lancastriense.*—Flowers pink with darker veins.

G. striatum. — Flowers flesh, prettily veined with purple. Flowers from May onwards. Height, 1 ft.

G. Traversii.—Flowers white or pink. Flowering Period, May to July, slightly tender. Height, 6 ins.

See also *PELARGONIUM.*

GERMAN CATCHFLY (*Lychnis Viscaria*).—See *LYCHNIS.*

GERMAN CHAMOMILE.—See under CHAMOMILE in *MEDICINAL HERBS.*

GERMAN MADWORT.—See *ASPERUGO.*

GERMANDER.—See *TEUCRIUM.*

GERMANDER SPEEDWELL (*Veronica Chamaedrys*).—See *VERONICA.*

GERMINATION OF SEEDS.

Every perfect seed contains a young plant, and germination may be looked upon as the birth of this plant, the beginning of its separate existence, for the seed is as truly a part of the parent plant as a bud. But although the perfect seed contains a young living plant, we see no growth until it is placed under certain conditions. While the seed is kept in a dry place it remains dormant, asleep, but not dead; it is living, and, although breathing is very feeble, it has not ceased. In all living cells, animal or vegetable, we have that wonderful material, protoplasm, apart from which there can be no life. Under favourable conditions protoplasm is very active, in some cells moving freely, and in all carrying out important physical and chemical changes. When the temperature falls to anything approaching zero, protoplasm becomes inactive, dormant, and so it does when the cells dry up as they do in a ripening seed. Water is essential for its activity. Protoplasm being living matter needs oxygen for respiration in the plant as in the animal; in its absence there can be no liberation of energy in the cells, and protoplasm then becomes inert or dead. In order, therefore, that the dormant plant within the seed may awake and grow, three or four conditions must be satisfied :—

(1) **Moisture.**—Most seeds, if kept dry, live for several years, although we have good grounds for disbelieving the mummy-wheat story. Very few grains of wheat out of a hundred selected would grow after being kept for twenty years. It may be accepted as a rule that the most vigorous seeds are those of the preceding season. When placed in damp soil, seeds absorb moisture, and vital activity soon commences.

(2) **Heat.**—None of our garden or farm seeds germinate at a temperature much less than 40° F., and for rapid and successful germination a much higher temperature is necessary. Most seeds, when dry, can stand great extremes of heat and cold without apparent injury.

(3) **Air or Oxygen.**—As soon as moisture has entered the cells of the seeds, the protoplasm becomes active and respiration increases in vigour. For this, as in the animal, oxygen is necesssary, and if seeds are placed in vessels in which there is a mixture of such gases as nitrogen, hydrogen, and carbon dioxide, but with no free oxygen, there will be no growth.

Light.—Probably the influence of light is not altogether favourable to germination; Nature and experience seem to indicate that the seed should be covered except, perhaps in the case of one or two of our grasses.

Ferments.—The three conditions of moisture, heat, and oxygen being satisfied, the protoplasm of certain cells begins to form compounds termed *ferments* or *enzymes*. Of these there may be many kinds, but usually we find at least three, and their function is to act upon the substances forming the endosperm or the reserve food stored in the cotyledons, and so change their form and composition that they dissolve in the water of the cells and pass down by way of the cotyledons to the young, growing plant.

The most important of these ferments are :—

DIASTASE, which converts starch into soluble sugar;

TRYPSIN, which acts upon nitrogenous substances called proteids, making them soluble and diffusible;

LIPASE, which breaks down the fats.

Assisting Germination. — We cannot always depend upon finding ideal conditions in the soil when seed-sowing, but we must do our best to assist Nature. Indoors we can regulate them all very easily, especially where we have artificial heat. Out of doors there may be an excess of moisture in the soil which will mean insufficient air or oxygen, and, possibly, a low temperature. Such soils should be well cultivated in dry weather, and everything done to remove superfluous water before seed-planting is carried out, or the seeds may rot. Long, strawy, farmyard manure should be applied in the autumn to such soils; its decay will produce heat which will tend to dry the soil and raise its temperature, and it will also tend to lessen the consolidation of these heavy soils. On light, sandy soils we have very different conditions; they are dry, warm, and well aerated, and the only difficulty will be lack of moisture. It is an easy matter for the gardener to water the surface of a small plot, but difficult for the farmer to so treat a field, and for both there is a much better method. Although the surface soil may be too dry, there is usually plenty of water below, and what we have to do is to assist its passage up to the stratum of soil where the seeds are to lie. The way to do this to pack the soil, consolidate it, so that its tiny particles are brought closer together, and the water rises rapidly, passing from particle to particle by capillarity.

The depth at which we place the seeds in the soil for successful germination must depend chiefly on the size of the seed, which really means on the amount of reserve food which it contains. This is intended to feed the young plant until it is able to manufacture its own food, which will not be till the roots are well established in the soil, and the leaves exposed to light and air above the soil. Then, but not before, the young plant will be able to make those substances that form its true food—starch, sugar, fats, and proteids. For the production of these compounds raw material must be taken from the soil by the roots and from the air by the leaves, and light is also necessary to supply the energy. It is evident that if small seeds were placed at a depth of 3 or 4 ins., although the shoot grows rapidly it will probably be an inch below the surface when the exhaustion of reserve food takes place and the plant dies of starvation. In the majority of cases a depth of five times the greatest length of the seed will be sufficient, but no hard and fast rule can be made, as much depends on the other conditions. Making a hole with a sharp stick and dropping in a seed is unsafe; a blunt stick is preferable, but an open trench is safer still.

Time Required.—The time required for germination varies with the kind of seed; our cereals take

TEMPERATURE AND TIME FOR GERMINATION.

Plant.	Minimum Temperature.	Optimum Temperature.	Maximum Temperature.	Time to Germinate.	Time to appear above soil.
Cereals	41° F.	82° F.	100° F.	3 days.	12 days.
Mustard	32° F.	83° F.	99° F.	1–2 ,,	4 ,,
Turnips	46° F.	89° F.	109° F.	2 ,,	6 ,,
Peas	44° F.	89° F.	102° F.	3 ,,	10 ,,
Beans	41° F.	90° F.	105° F.	4 ,,	16 ,,
Cucumber	51° F.	93° F.	115° F.	7 ,,	42 ,,
Clovers	44° F.	88° F.	111° F.	3 ,,	14 ,,
Maize	49° F.	93° F.	115° F.	3 ,,	22 ,,
Carrot	45° F.	88° F.	103° F.	6 ,,	38 ,,
Veg. Marrow	56° F.	93° F.	115° F.	6 ,,	15 ,,

four or five days; the willow only twelve hours; while hard seeds of clover and other plants may take some months. Germination in such seeds is assisted by filing or rubbing the covering or testa (shaking them up with sand, etc.).

The period necessary for germination will depend upon the conditions named above, the temperature being probably the factor which has the greatest influence in shortening the time. The following results have been recorded :—

DAYS TAKEN FOR GERMINATION.

Seed.	At 40° F.	At 50° F.	At 60° F.	At 66° F.
Pea	5 days.	3 days.	1¾ days.	1½ days.
Horse Bean . . .	7 "	6½ "	4¾ "	4¼ "
Poppy	10 "	4¾ "	2½ "	2 "
Rape	6 "	2 "	1 "	1 "
Beet	22 "	9 "	3¾ "	3½ "
Maize	—	11¼ "	3¼ "	3 "

The number of days multiplied by the temperature gives what is termed the "Thermal Constant." Thus the thermal constant of the pea may be taken as about 150.

Further information about sowing will be found in the article on *Seed-Sowing*.—W. B.

[The average germination of the principal seeds will be found in our article on *Seed: Average Germination of*.—Editor.]

See also *Seed Sowing*.

GERMINATION TEST.—See *Seed Testing*.

GEUM (Avens. Nat. Ord. Rosaceæ).—The Geum is a really first-class hardy perennial for cutting. It is easy to grow too, and this fact has already commended it to many amateur gardeners. It thrives in any good, light, rich, well-drained soil, in a very sunny open site, and is easily propagated by sowing seeds in sandy soil out of doors in the spring, or by division of the rootstocks in November or February.

Perennial Border Species.—The best are given below :—

Geum chiloense flore pleno (Syn. *G. coccineum flore pleno*).—This is a dazzling double scarlet Geum, of first order of merit. Its flowering period is July, and its height is about 18 ins.

G. chiloense grandiflorum (Syn. *G. coccineum grandiflorum*).—This also has bright scarlet flowers. Its height and flowering period are the same as the above.

G. chiloense Mrs John Bradshaw is probably the most handsome and widely grown of all Geums. Its flowers are of great size, and of scarlet too gorgeous to describe. It is wonderful for cutting. It has two flowering periods, May to July, and late August. *Mr John Bradshaw* is similar, but bears orange-yellow flowers. Both average 18–24 ins. in height.

G. Heldreichii.—The flowers of this are bright orange-red and very attractive. They are freely produced from May to August. Height, 12 ins. The variety of this, named *splendens*, has a R.H.S. Award of Merit and has larger flowers.

G. japonicum.—A yellow summer-blooming species. Height, 12–24 ins.

G. pyrenaicum.—A good yellow

June blooming Geum. Height, 18 ins.

G. rivale, Guildford or Leonard's Variety.—A pretty form of the WATER AVENS. Flowers pink, in bloom May to July. Moist position required. Height, 9 ins.

G. strictum. — A hairy species blooming in late May, June, and July. Height, about 24 ins.

G. urbanum (COMMON AVENS).—A good species for town gardens. Flowers are yellow, and given from May to July. Height, 15-36 ins.

Rock Garden Species. — Three species of this genus are essentially rock plants. They thrive in well-drained gritty loam, and are propagated by division in the autumn.

Geum montanum. — A plant of dwarf compact habit. Flowers bright yellow. Site sunny. Soil deep loam. Flowering Period, May to July. Height, 9 ins. (In the variety *aurantiacum* the flowers are orange.)

G. reptans. — A creeping and tufted species. Leaves pinnate. Flowers clear yellow. Site half-shade. Soil deep, very gritty, with plenty of moisture. Flowering Period, June to July. Height, 4 ins.

G. Rossii.—A distinct species with pinnate leaves. Flowers yellow. Soil common. Flowering Period, June to July. Height, 6 ins.

GHENT AZALEAS.—See *AZALEA: HARDY SPECIES.*

GHERKIN.

This is a kind of small cucumber, used mostly for pickling, but sometimes made into fruit pies. It may be grown in the same way as *CUCUMBERS*, articles on the indoor and outdoor culture of which appear elsewhere in this work.

GIANT ASPHODEL.—See *EREMURUS.*

GIANT FENNEL.—See *FERULA.*

GIANT FIR (*Abies grandis*).—See *TREES.*

GIANT HIMALAYAN LILY (*Lilium giganteum*) —See under LILY in *WATER GARDEN: PLANTS FOR THE.*

GIANT PINK (*Dianthus giganteus*).—See *DIANTHUS.*

GIANT QUAKING GRASS (*Briza maxima*). — See *ORNAMENTAL GRASSES.*

GIANT SPOTTED FOXGLOVE (*Digitalis gloxinaflora*).—See *FOXGLOVE.*

GIANT SUNFLOWER (*Helianthus annuus*).—See *SUNFLOWER.*

GIGANTOCHLOA.—See *BAMBOOS.*

GILIA (Nat. Ord. Polemoniaceæ). This is a large and interesting genus containing numerous annual species of considerable value in gardens. Most of the plants have narrow, elegant leafage, and flower very freely from a sowing made in light soil in September. A March or April sowing, where soil and climate do not favour autumn sowing, will give good results. The charming little plants often known as *Leptosiphons* belong rightly to this genus, and they are delightful for the rock garden. The flowering period extends throughout the summer.

Annual Species.—A few of the best with the briefest possible description are mentioned below. For many others larger works must be consulted.

Gilia achilleaefolia.—Blue-purple. Height, 18 ins.

G. androsacea.—Pink, with yellow throat. Height, 9 ins. The variety *rosea* has rose-coloured flowers, and there is also a white form.

G. capitata.—Blue. Height, 12 ins.

G. densiflora (Syn. *G. Leptosiphon* and *Leptosiphon densiflorus*). — Rosy-lilac. Height, 12 ins. The variety *alba* is white.

G. dianthoides. — Lilac. Height, 6 ins.

G. laciniata. — Purple. Height, 9 ins.

G. micrantha (Syn. *Leptosiphon*

parviflorus rosaceus). — Rose. Height, 9 ins.

G. tricolor.—There are white, blue, and violet forms of this, each with a yellowish centre; and there is a dwarfed strain which is desirable. The largest averages 9–15 ins. high.

Biennial Species.—Only two are worthy of extensive culture:—

Gilia coronopifolia (Syn. *Ipomopsis elegans*). — This and *G. aggregata* have long, tubular, scarlet flowers, which are produced on unbranched, upright stems, 2–4 ft. high, from July to September. They are also known under the generic name of *Ipomopsis*. *G. aggregata* differs from the former by having cobwebbed leaves, and channelled lobes to the flowers. Both are most easy to bring to perfection by sowing the seeds in gentle heat in January or February, growing the seedlings in small pots and planting them out in May. For the usual biennial culture, sow seeds in June or July, pot them up, wintering them in a cold frame or greenhouse to keep the foliage scrupulously dry, and plant them out in May.

GILLENIA (Nat. Ord. Rosaceæ).

This genus is of no great importance, and only two species are grown at Kew. These are, however, rather attractive plants, and should be included in large herbaceous borders where space admits of a fairly representative collection. Both the species described below succeed in ordinary garden soil; they may be propagated in the usual way by division of the roots in the autumn or spring, and may be successfully planted from October to March.

Gillenia stipulacea (AMERICAN IPECACUANHA).—This bears red and white flowers in July, and averages 1½ ft. high.

G. trifoliata (Syn. *Spiraea trifoliata*). —This, the INDIAN PHYSIC, is similar in its characteristics to the above.

GINGIDIUM.—Now included in the genus *ACIPHYLLA*.

GINKGO.—For the best species see *TREES*.

GIPSY WORT.—See *LYCOPUS*.

GIRA (*Alnus nitida*).—See *TREES*.

GITHAGO.—Now included in the genus *LYCHNIS*.

GLACIER PINK (*Dianthus glacialis*).—See *DIANTHUS*.

GLADIOLUS (CORN FLAG. Nat. Ord. Iridaceæ): **Culture.**—Of all the flowers of the garden, none display so great a range of colour as the Gladiolus, and the possibilities are even now far from being exhausted. The markings on the lower petals, in some flowers softly blending and in others in sharp and vivid contrast, add to their beauty and infinite variety. Their tall and many-flowered spikes rising well above the setting of their leaves render them conspicuous among the more spreading plants of the herbaceous border, and give them an air of stately distinction.

There are about a hundred and fifty species of Gladioli, mostly natives of South Africa, of which only eight or ten have been used in the production of the principal races of autumn flowering Gladioli. Three species—*Cardinalis*, with large open flowers of crimson-scarlet with a white throat and lines; *Oppositiflorus*, with long-flowered spikes of pale lilac-white; and *Psittacinus*, with strongly hooding flowers of vermilion and yellow—are probably the chief parents of the GANDAVENSIS race,—the Florists' or *Exhibition* Gladiolus. The LEMOINEI race arose from the union of these *Gandavensis* varieties with *Purpureo-auratus*, a species having pale sulphur-coloured flowers with deep red-brown blotches; the violet-blue section being derived probably from *Papilio*, a mottled reddish-purple flowered species. By crossing the *Gandavensis* and the *Lemoinei* varieties with *Saundersii*, which has large wide-spreading flowers of light scarlet or Lincoln red and a finely spotted throat, the CHILDSII and NANCEIANUS races were produced. Lastly, with the introduction of *Primulinus* in 1902, a pale primrose-yellow species with strongly hooding flowers and a light open spike, a new race with beautiful "art" colours has been developed.

A few other species have been used in lesser degree: *G. Cruentus*, a large-flowered species with rich carmine flowers, is one of the parents of *Princeps*, from which a new race is now slowly developing, and *Sulphureus* has been used by Lemoine as a parent of his *Précoce* varieties. *G. Cooperi*, *Dracocephalus*, *Eckloni*, *Quartinianus*, and two or three others have been experimented with, but nothing of any horticultural importance has yet been obtained.

Besides these tall autumn flowering races there are also the early summer flowering varieties, including *G. Colvillei* and *G. C. albus*, a hybrid of *Cardinalis* and *Tristis*, and some of the smaller flowered species—*G. Alatus*, *Blandus*, *Cuspidatus*, *Leichtlini*, *Tristis*, and *Watsonius*—which are of lesser importance, but are useful for pot work in a cold greenhouse or in frames. *G. Colvillei* is also hardy in sheltered well-drained situations in the warmer counties of England, increasing fast and forming dense clumps. All these are South African species. There are a few quite hardy European species, but only one, *byzantinus*, with bright purple narrow-petalled flowers, is worth growing in the herbaceous border. *G. atroviolaceus* and *G. Crispiflorus*, established in the rockery among low-growing plants, give a pleasing effect.

The distinctive characters of the principal races of Gladioli fit them for various purposes in the garden. For exhibition the GANDAVENSIS race is supreme. Starting with the original seedling raised by Van Houtte in 1841, Souchet in France laid the foundation of the race which now bears its name. Vilmorin and Brunelet carried on the work, and these varieties have now been brought to a pitch of perfection by James Kelway and his son, who have devoted long years to their improvement, and the strain they have evolved form the ideal of the Florists' Gladiolus. The colours are chiefly white, pink, red, and purple, and quite lately the range of colour has been extended by their *Golden Measure*—a pure yellow Gandavensis. These varieties have tall straight close-set spikes with large flowers, and as many as ten or even twelve open at once. They are effective in the border also under some conditions, but are somewhat stiff and formal, and the very fact of their splendour has the drawback that they do not last so long in flower. The CHILDSII race has much of the habit and character of the Gandavensis, with more varied colours and markings, and is less formal. It flowers earlier, is more easily grown, and the flowers come out more gradually, but lack something of the substance of the Gandavensis. The LEMOINEI, NANCEIANUS, and PRINCEPS races are of a different habit, and are more suitable for general border cultivation. The spikes are less stiff and the flowers are generally more open, and since the distinctive feature of these races is the infinite variety of the markings and their contrasts with the ground colour, these characteristics display the individual flowers most effectively. These as a rule flower more gradually and make a longer display in the borders. They also make good cut flowers; but best of all for this purpose are the PRIMULINUS HYBRIDS or art race, for these have even more open spikes, light and graceful, and the colours include, besides pure yellows and reds, all the art shades of amber, cream, salmon, coral, and terra-cotta.

Cultivation.—There seems to be an impression that Gladioli are difficult to cultivate—that they die out. This is not so. As with all florists' flowers, there are some varieties with uncertain constitutions, but in general, if given proper treatment, there is no flower easier to grow. They can be grown successfully in any good garden soil, but do best in a stiff loam. If the soil is light and porous it must be well mulched, or other means taken to conserve the moisture, which is so essential to them when in full growth and flowering, and in a dry season, in such a situation they may need artificial watering. The most essential condition in growing Gladioli is a deep and well-worked soil, with a good natural drainage, and failures are generally due to the practice of dibbling the corms into the herbaceous border, which has only been surface-dug, or not at all. Being natives of South Africa, they should be given the sunniest and most open situation possible. The ground must be deeply dug and, if possible, trenched in the autumn, adding a good dressing of basic slag or bonemeal, and lime if deficient (*Princeps* varieties, however, seem to prefer a more acid medium). Well-rotted manure may be used if it is buried beneath the top spit. In the spring, a few weeks before planting time, the ground should be again forked over with a dressing of any good "complete" artificial manure.

Planting.—Gladioli may be planted any time from the middle of March to the middle of May, but about the first week in April is the best time for general planting, depending on the season and the state of the soil. They should not be planted while the soil is wet and sticky, and little if anything is gained by planting any earlier, since there is danger of the dormant corms being damaged by cold and wet. The corms should be planted at least 3 ins. deep,—that is, with 3 ins. of soil over the *tops* of the corms,—and the larger and stronger-growing Gandavensis race should be planted 4–5 ins. deep, in order to give adequate support to their heavier spikes. If planted shallower, they will need to be staked early and securely, otherwise the first strong wind will blow them over, and strain them so that they will neither flower well nor produce healthy corms for the next year. After planting, the ground should be made firm, and even rolled with a heavy roller if the soil is light. When the tips of the spikes are all above ground, hoe lightly to keep down the weeds and produce a thin mulch. No watering should be given before the middle of June, however dry the season; if very dry, they may be mulched. About the second week in June give a top-dressing of superphosphate and hoe it in lightly, to be washed down by the rains in June and July. In a suitable soil Gladioli never need any artificial watering, and keep healthy and flower freely whatever the season, but when the conditions render it absolutely necessary, it should be given thoroughly at intervals of a fortnight.

Taking Up.—After the flowering is over, the corms should be taken up, the first fortnight in October being the best time. They may, however, be lifted from the middle of September (for the earliest varieties) to the middle of November, choosing open weather so that they will come up clean and dry quickly. It is not necessary, or desirable, to wait for the leaves to turn yellow. The stem and leaves should be cut off at once ½ in. above the corm, the roots trimmed away, and the corms spread out to dry. As soon as dry enough—in a fortnight or three weeks—the old corm should be pulled off; it should come away easily with a clean scar. The corms should then be stored away in a frost-free but cool and dry place;—when the corms are *dry* and dormant an occasional cold down to freezing-point will do them no harm whatever, but a damp and warm atmosphere is most injurious, and will cause them either to decay or to start rooting prematurely.

Propagation.—Gladioli are increased by the small bulbils found attached to the base of the corm at lifting. These should be stripped and collected when trimming off the roots, and sown *thickly* as soon as possible (in November) in small trenches 2 ins. wide at the base and 3 or 4 ins. deep, and covered over with the soil, which the winter rains will settle firmly. The following spring these will throw up one or two slender leaves, which in the autumn should be cut off at the surface of the ground. Then take up the young bulbs with the soil, which last is washed away through a sieve. The young bulbs are then collected together with the unstarted bulbils—for usually only a proportion start the first season. The small bulbs can then be treated as ordinary corms and grown on to flowering size, lifting and replanting each year. The unstarted bulbils, which will now be black and partially retted, may be resown in trenches as before—they will all start the second year. The Lemoinei and Nanceianus races, and some of the Primulinus hybrids, will flower from the second season after planting the bulbils, and most will flower the third season. The Gandavensis, Childsii, and Princeps races are longer in coming to flowering size—from three to five years.

Varieties.—The Gladiolus is still in the making and the development is rapid. The tendency of hybridisers now is to mix the races so that eventually the Florists' Gladiolus will include something of all these species that have been used: the markings of *Purpureo-auratus*; the fine form of *Papilio*, and the colour of its "blue" varieties; the size and rich pure scarlet of *Cruentus*; the pure yellow and all the art shades of *Primulinus*; combined with the tall, many-flowered, and perfectly set spikes of the *Gandavensis*. The number of named varieties is very great; there are literally thousands, and any extended list would soon be out of date. The reader therefore should consult the lists of raisers and specialists for the newest varieties, the lists of certified varieties of the Royal Horticultural Society and the National Gladiolus Society, and the registered list of Gladioli in the *Gladiolus Annual* (N.G.S.).

The following select list includes only a few new varieties which are of outstanding merit, or those which have stood the test of time and are still unsurpassed. For full descriptions see the *Gladiolus Annual*.

Pink.—Dawn (Groff), Loveliness (de Ruyter), Panama (Banning).

Purple.—Orby (Kelway).

Rose.—Ariel (W. C. Bull), Brooklands (Kelway), Halley (K. Velthuys).

Scarlet and Red.—Gallieni (Brunelet), Liebesfeuer (K. Velthuys), Meteor (Pfitzer), Princeps (Van Fleet).

Violet-Blue.—Baron Joseph Hûlot (Lemoine).

White.—Europa (Pfitzer), Incontestable, L'Innocence (Vilmorin), Marie Thérèse (Vilmorin), Rathline (W. C. Bull).

Yellow.—Golden King (G. D. Black), Golden Measure (Kelway), Glory of Noordwyk (Van Zanten).

A. J. B.

UP-TO-DATE SELECTIONS.

Gladiolus Giant Amaryllis-Flowered Giant Lilac.—Lilac.

G. G. A.-F. Giant Rose.—Rose.

G. G. A.-F. Giant Salmon.—Salmon.

G. Large-Flowered Alice Amos.—Cream.

G. L.-F. Arthur Lockwood.—Pink.

G. L.-F. Beat All.—Pink and crimson.

G. L.-F. Commander Koehn.—Orange-scarlet and crimson.

G. L.-F. Eskimo.—White.

G. L.-F. Gladness.—Scarlet.

G. L.-F. Glory of Holland.—Cream.

G. L.-F. Jungfrau von Orleans.—Cream.

G.L.-F.L.Van Beethoven.—Mauve-blue.

G. L.-F. L. C. Adkins.—Pink and cream.

G. L.-F. La Gaieté.—Pink.

G. L.-F. Libelle.—Heliotrope.

G. L.-F. Odin.—Salmon.

G. L.-F. Peace.—White.

G. L.-F. Pink Perfection.—Pink.

G. L.-F. Panama.—Rose.

G. L.-F. Prince of Wales.—Salmon.

G. L.-F. Red Emperor.—Red.

G. L.-F. Yellowhammer.—Dark yellow.

G. Primulinus Abricot.—Orange-yellow.

G. P. Apricot Queen.—Apricot hue.

G. P. Atalanta.—Orange-salmon and gold.

GLASS.

Obviously glass is almost indispensable to the gardener who wishes to raise subjects early, and we should feel somewhat lost without the greenhouses, frames, bell-glasses, and cloches we use so much. The best glass is that known as 21 oz. Thick plate-glass or glass even slightly tinged with any colour has a detrimental effect on plant growth, and may paralyse promising subjects in a very short time. Glass can usually be cleaned without difficulty by rubbing it with a mixture of fine ashes, pumice, and strong sulphuric acid. If that fails, hydrofluoric acid will remove any stains in a moment. This acid is very dangerous to use, however. It has to be applied with a rubber pad and quickly washed off, otherwise it may dissolve the glass away. (See article on *ACIDS: THEIR USES IN HORTICULTURE.*)—E.

GLASS SUBSTITUTES.

Whilst for transparency there is nothing to equal glass, it is possible to prepare substitutes that will admit a considerable amount of light. These are often useful for repairing glass breakage in a greenhouse, and they are quite serviceable as frame lights where it is desired to save expense. The materials which are employed in the making of glass substitutes are calico or paper. Naturally the cloth is the more durable, but after proper treatment paper will resist the weather to a remarkable degree.

Calico as Glass.—Where calico is employed only fine material should be purchased. The pieces should be tacked somewhat loosely over the frame. Then the following mixture for application to the calico should be prepared:—

Linseed Oil (pale) . .	1½ pint.
Lead Acetate . . .	½ oz.
White Resin . . .	2 oz.

The acetate should be ground with a little of the oil, then the rest added, and finally the resin thrown in. The ingredients must be incorporated in an iron pot over a slow fire. Apply the mixture hot to the calico and leave the material in a loose state for a day. Then stretch out tightly and tack down where it is to remain.

Paper as Glass.—For the paper lights it is best to use cartridge paper. In the first place the paper should be well moistened all over. Then it should be tacked on to the frames as tightly as possible. To prevent the paper from tearing away from the nails a strip of tape should be run along where the tacks are driven in. When the paper dries it will stretch tightly across the frames and it may then be painted with the following preparation. Secure a pint of boiled linseed oil and mix with this a piece of white lead about the size of one's thumb. This is easily accomplished if the white lead is worked up with some of the oil and the remainder is then added. The paper lights will be found to resist rain to a remarkable degree.

Both these glass substitutes, although not completely transparent, admit a considerable amount of light. It may be necessary to repaint them over occasionally to prevent them suffering from the weather.—S. L. B.

GLASTONBURY THORN (*Crataegus Oxyacantha monogyna praecox*).—See *TREES*.

GLAUBER'S SALTS.—See SODIUM SULPHATE in *SODA AND SODIUM COMPOUNDS*.

GLAUCIDIUM (Nat. Ord. Ranunculaceæ).—This is a new hardy herbaceous plant of some promise from Japan. It is of easy culture, requiring no more than the usual treatment. The one species so far introduced, *G. palmatum*, bears mauve flowers in June, and grows about 2 ft. high.—W. J. C.

GLAUCIUM.—See *HORNED POPPY*.

GLECHOMA.—Now included in the genus NEPETA.

GLEDITSCHIA.—For the best species see *TREES*.

GLOBE AMARANTH (*Gomphrena globosa*).—See *ANNUALS, HALF-HARDY: LIST OF*.

GLOBE ARTICHOKE. — See *ARTICHOKES* and *ORNAMENTAL VEGETABLES*.

GLOBE BEET.—See *BEETROOT*.

GLOBE DAISY.—See *GLOBULARIA*.

GLOBE FLOWER.—See *TROLLIUS* and *WATER GARDEN: PLANTS FOR THE*.

GLOBE THISTLE.—A name applied to the genus *ECHINOPS*, which see.

GLOBULARIA (GLOBE DAISY. Nat. Ord. Selaginaceæ).—Dwarf perennials of tufted habit, which thrive well in rather moist, well-drained positions, and are propagated by division in autumn or spring.

Rock Garden Species.—*Globularia cordifolia*.—A mass of prostrate twiggy growths. Leaves small. Flowers blue. Site open. Flowering Period, June. Height, 3 ins.

G. nana.—Like the above, but smaller in all parts. Site moist moraine. Flowering Period, June. Height, 2 ins.

G. vulgaris (BLUE DAISY).—Mats of dark green shining leaves. Flowers bright blue in heads. Flowering Period, June to July. Height, 9 ins.

GLORY OF THE SNOW.—See *CHIONODOXA*.

GLORY PEA.—See *CLIANTHUS*, and under CLIANTHUS in *CLIMBING AND TRAILING PLANTS*.

GLOXINIA (Nat. Ord. Gesneraceæ).—This is a greenhouse tuberous-rooted perennial growing 9–12 ins. high, bearing brilliantly coloured flowers in many shades.

Propagation is best effected by seed, division of tubers, and by leaf cuttings.

Culture.—Seed may be sown as early as January if a temperature of 65–70° F. is at command. From these early sowings plants can be had in bloom in six or seven months. If stock is wanted for flowering the following year, the seed will germinate quite well in a cold house in May or June. To perpetuate any particular variety the tubers may be divided, or increase may be secured by dibbing leaves into sandy soil, or laying them, underside downwards, in a similar compost, having previously slit the mid-rib at four or five points with a sharp knife. A good compost to use for the mature plants should contain equal parts of fibrous loam, leaf-soil, and peat, with a little dried cow manure, and enough rough charcoal chips or coarse river sand to secure proper drainage. A moist atmosphere and shade from hot sun are beneficial, and frequent fumigation is necessary to keep pests in check. (See article on *FUMIGATING.*)

USES.—For greenhouse decoration from the latter part of July till the middle of September nothing can beat Gloxinias. By means of successional sowings, as stated above, the flowering period may be greatly lengthened.

Varieties.—There are many named varieties, but the flowers derived from a really good strain of seed are practically as fine.—J. L. G.

GLYCERIA (MANNA GRASS. Nat. Ord. Gramineæ).—This is a genus of hardy aquatic grasses of little value but appreciated by bog garden enthusiasts. They grow with the least possible attention and spread quickly. *G. fluitans*, the FLOTE GRASS, and *G. maritima*, the SEA SPEAR GRASS, are the two best known species, but *G. aquatica* (Syn. *G. spectabilis*) and *G. distans* are also grown at Kew.

GLYCYRRHIZA.—See LIQUORICE in *MEDICINAL HERBS.*

GNAPHALIUM.—See *CUDWEED* and *EVERLASTING FLOWERS.*

GNATS.

Gardeners are often sorely tried by gnat bites, which, though not usually considered serious, may turn into cases of blood poisoning. Thus it is advisable to protect oneself from these annoying creatures, and this can easily be done by lightly rubbing the face, neck, hands, and wrists with Oil of French Geranium, a non-proprietary article obtainable at most chemists. Gnat bites may be soothed and quickly cured if a little Oil of Myrbane is rubbed over them. Neither of these oils have an unpleasant odour, nor a detrimental effect on the skin, and are comparatively inexpensive.

GOAT MANURE.—See *SHEEP MANURE.*

GOAT MOTH.—See *INSECT PESTS.*

GOAT WILLOW (*Salix Caprea*).—See *TREES.*

GOAT'S BEARD.—See *ASTILBE SPIRAEA*, *TRAGOPOGON*, and *WATER GARDEN: PLANTS FOR THE.*

GOAT'S-BEARD GRASS.—See *ÆGOPOGON.*

GOAT'S RUE.—See *GALEGA.*

GODETIA (*Œnothera.* Nat. Ord. Onagraceæ).—The Godetias are probably among the most popular of all annuals. Failure in their culture is frequently due to thick sowing or thick planting. Nine or twelve ins. apart, according to variety, is not too much space to allow, if sturdy bushes and a long-continued display of bloom are the aim of the cultivator. For the size of the plants the flowers are large, and as they are well expanded the effect produced is very fine. Godetias are suitable alike for bedding, for grouping in borders, for cutting, or even for pot culture for greenhouse decoration. Seeds should be sown in autumn and again in spring, if possible where the plants are to bloom.

What to Grow.—Below we describe the best :—

Godetia amoena.—This is the Californian species from which the popular Godetias have been developed, with their wide range of colouring. A few of the best-named sorts are: *Bridesmaid* (bluish rose); *Crimson King* (vivid crimson); *Duchess of Albany* (white); *Duke of York* (deep red); *Lady Satin Rose* (rose pink); *Scarlet Queen*; and *Schaminii* (double, long-lasting, soft rose-pink). Dwarf forms are also to be obtained. The above bloom throughout the summer, and average 1–2 ft. in height.

G. densiflora.—A purple, summer-flowering sort about 3 ft. high.

G. Whitneyi.—Of this Californian species there are cream, scarlet, and white forms obtainable. All bloom freely throughout the summer, and average 1½ ft. in height.

GOLD FERN (*Gymnogramme calomelanos* vars. *Chrysophylla* and *Martensii*).—See *FERNS AND FERN GARDENING.*

GOLD MILKMAID (*Ilex aurea mediopicta*).—See *HOLLY.*

GOLDEN BELL (*Forsythia intermedia*). See *CLIMBING AND TRAILING PLANTS.*

GOLDENCALLA (*Richardia elliotiana*). See *ARUM LILIES.*

GOLDEN or CHINESE LARCH.—Names applied to genus PSEUDOLARIX. See *TREES.*

GOLDEN CROWN (*Coreopsis tripteris*). See *COREOPSIS.*

GOLDEN DOCK (*Rumex maritimus*). See *RUMEX.*

GOLDEN DROP (*Onosma echioides*).—See *ONOSMA.*

GOLDEN ELDER (*Sambucus nigra foliis aureis*).—See *TREES.*

GOLDEN FEATHER (*Pyrethrum aureum*). — See *ANNUALS, HALF-HARDY : LIST OF.*

GOLDEN KNEE.—See *CHRYSOGONUM.*

GOLDEN LARCH (*Pseudolarix Kaempferi*).—See *TREES.*

GOLDEN-LEAVED CHESTNUT (*Castanopsis chrysophylla*).—See *TREES.*

GOLDEN PRIVET (*Ligustrum vulgare aureum*).—See *SHRUBS.*

GOLDEN QUEEN HOLLY (*Ilex Aquifolium aurea regina*).—See *HOLLY.*

GOLDEN ROD.— See *SOLIDAGO* and *WATER GARDEN: PLANTS FOR THE.*

GOLDEN THISTLE.—See *SCOLYMUS.*

GOLDILOCKS (*Aster Linosyris* and *Ranunculus auricomus*).—See footnote and note to articles on *ASTER* and *RANUNCULUS.*

GOMPHRENA.—See *ANNUALS, HALF-HARDY : LIST OF.*

GONIOLIMON.—Now included in the genus STATICE.

GONIOPHLEBIUM and GONIOPTERIS.— Both now included in the genus POLYPODIUM, for which see *FERNS AND FERN GARDENING.*

GOOD KING HENRY.—See *CHENOPODIUM* and *MERCURY.*

GOOSE DUNG. — See *POULTRY MANURE.*

GOOSEBERRY (*Ribes Grossularia*).—See *BUSH FRUITS*, also under RIBES in *SHRUBS.*

GOOSEBERRY DIE BACK.—See *DISEASES OF PLANTS.*

GOOSEBERRY MILDEWS, AMERICAN AND EUROPEAN.—See *DISEASES OF PLANTS.*

GOOSEBERRY SAWFLY.—See CURRANT AND GOOSEBERRY SAWFLY in *INSECT PESTS.*

GOOSEBERRY SCALE.—See under BROWN SCALES in *INSECT PESTS.*

GOOSEBERRY SPOT. — See under CURRANT SPOT in *DISEASES OF PLANTS.*

GOOSEFOOT.—See *CHENOPODIUM.*

GOOSEGRASS.—A troublesome weed. See *ASPERUGO, GALIUM*, and *WEEDS.*

GORSE. — The genus ULEX. See *SHRUBS.*

GOURD (*Cucurbita Pepo*).—See *CUCURBITA.*

GOURDS.—See *ORNAMENTAL GOURDS* and *PUMPKINS AND GOURDS.*

GOUTWEED.—For MEANS OF CONTROL see BINDWEED in *WEEDS.* See also *ÆGOPODIUM.*

GRADING FRUIT.—See *FRUIT GRADING AND PACKING.*

GRAFTING.—See *PROPAGATION OF PLANTS.*

GRAFTING WAX.

Two kinds of grafting wax are usually employed. The first is that which has to be heated before it can be used; the second is always in a soft condition, or, at any rate, can be rendered pliable by the warmth of the hands.

A very useful grafting wax to be used warm is prepared in the following manner:—

Melt together in an old pan one part of tallow, one part of bees' wax, and four parts of resin. Pour the liquid into a pail of cold water and pull the lump that is formed about until the ingredients are well mixed. Another composition also used in a warm state is cheaper to prepare seeing that bees' wax is not needed. The ingredients are eight parts resin, three parts tallow, one part Burgundy pitch, and three parts of red ochre. The materials should be melted in a pan over a slow fire and thoroughly well stirred. Both the above grafting waxes have to be softened by heat before use.

The so-called cold compositions are largely produced by French firms and can be bought ready for use. Where a small quantity only is needed it is best to purchase a tin of this mastic. A good recipe for a liquid grafting wax that is always ready for use is as follows:—

Melt 1 lb. of resin over a gentle fire. Then add 1 oz. of beef tallow and stir well. Take the pan off the fire and pour in 8 oz. of alcohol or spirits of wine. Stir well and replace on the fire until all is well mixed. The utmost care should be taken to avoid the ignition of the spirits, and the safest place on which to prepare the mixture is a closed range. When the wax assumes the consistency of thick treacle it may be stored in tins with tight-fitting lids. This mastic is always in perfect condition for use.

Where a large number of trees has to be grafted, the old plan of using clay is by no means to be despised. This is both inexpensive and efficient. The mixture is composed of two parts of clay and one part of fresh cow dung. Finely chopped hay or grass added to the clay and cow manure will aid in keeping the composition together. As a rule, where grafting clay is employed, it is better to use a piece of rag or something similar to keep the material in position.—S. L. B.

GRAMA GRASS.—See *BOUTELOUA.*

GRAMMATOPHYLLUM. — See *ORCHIDS.*

GRAND OX-EYE DAISY (*Chrysanthemum uliginosum*).—See *CHRYSANTHEMUM: PERENNIAL BORDER SPECIES*

GRANITE PINK (*Dianthus graniticus*). See *DIANTHUS.*

GRAPE.—See *VINES.*

GRAPE HYACINTH.—This is a favourite name for several species of HYACINTHUS and MUSCARI, but is chiefly applied to *Muscari botryoides.* See *GRAPE HYACINTHS* below.

GRAPE HYACINTHS (*Hyacinthus* and *Muscari.* Nat. Ord. Liliaceæ).—The Grape Hyacinths are a valuable spring-flowering race of bulbous plants. They are very hardy, with one or two exceptions, and they are good doers. *Muscari Heavenly Blue* is comparatively a recent introduction from Trebizond, but it has already acquired a reputation second to none as a "great" garden plant. The Feather Hyacinth (*Muscari comosum monstrosum*) is a quaint and pretty monstrosity and succeeds very well if grown in pots or pans for cut flowers. The little Cambridge Blue Grape Hyacinth (*Hyacinthus azureus*) comes into bloom with the Snowdrops. It makes an excellent plant for rockwork. Some varieties, such as the old typical Grape Hyacinth (*Muscari botryoides*) and the newer *Heavenly Blue*, do fairly well in grass, and may be naturalised in rough open spaces.

Culture.—There is little to be said under this head, as the different species and varieties are all so accommodating in their requirements. The Feather Hyacinths need a warm position, and in cold districts should be grown in pots. In fact, pot culture gives them such delicate and uncommon colouring that they might well be grown anywhere under glass. They must not be forced very much. *Heavenly Blue* and some other sorts never seem to go completely to rest. They should be lifted on the early side when the foliage is going yellow. Leaf growth commences very early, and it is impossible to keep the bulbs out of the ground for any length of time without some growth appearing. No notice of this need be taken when the bulbs are planted in October if it is not doubled up.

Species and Varieties.—The best are briefly described below :—

Hyacinthus azureus (Syn. *Muscari azureum*).—This, popularly known as the CAMBRIDGE BLUE GRAPE HYACINTH, bears delightful Cambridge blue flowers in February. It grows 3–4 ins. in height.

Muscari botryoides.—This is the old GRAPE HYACINTH with blue flowers in April, on plants 6–9 ins. high. Its variety *album* is a pretty white form.

M. comosum (TASSEL HYACINTH).—This, and its variety *monstrosum*, the FEATHER or FEATHERED HYACINTH, bear blue flowers in May and April respectively, on plants 6 ins. high.

M. conicum.—This is very like the well-known variety *Heavenly Blue*, and by some it is said to be synonymous. It flowers in April, and grows 9–10 ins. high.

M. Heavenly Blue.—This is one of the finest introductions of modern times. It resembles the old Grape Hyacinth in its general appearance, but has deeper and richer blue flowers and it is a taller grower. It blooms in April and May, and grows 10–12 ins. high in good soil. It has a powerful clove-like scent on hot sunny days, and makes a capital edging for borders or large beds.

M. paradoxum.—This bears very dark, almost black, flowers in May, and grows 12 ins. high.

M. plumosum.—This is useful for cutting if grown in cool greenhouses. It has no real flowers. The so-called inflorescence consists of fine twisting tendril-like stalks, coloured a pale purple in May, and is produced on plants 12–16 ins. high.

M. racemosum (STARCH HYACINTH).—This is a pretty deep blue-flowering subject flowering in April, and growing about 6 ins. high.

M. szovitsianum.—This bears large blue flowers in March or April, on plants 9 ins. high.—J. J. & E. T. E.

GRAPE MILDEW.—See VINE MILDEW in *DISEASES OF PLANTS*.

GRAPE ROT.—See *DISEASES OF PLANTS*.

GRAPES.—See *VINES*.

GRAPES: SHANKING OF.—See under GRAPES, SHANKING OF, in *DISEASES OF PLANTS*.

GRASS.—See *LAWNS AND THEIR MANAGEMENT*.

GRASS BANKS.—See *BANKS*.

GRASS HOOKS.—See *GARDEN TOOLS*.

GRASS OF PARNASSUS (*Parnassia*).—See *PARNASSIA* and *WATER GARDEN: PLANTS FOR THE.*

GRASS SEED.—This is referred to in the article on *LAWNS AND THEIR MANAGEMENT.*

GRASS SNAKE.—See *SNAKES.*

GRASSES, Ornamental.—See *ORNAMENTAL GRASSES.*

GRATIOLA (Nat. Ord. Scrophulariaceæ).—This genus, popularly known as HEDGE HYSSOP, is mentioned here for the purpose of drawing attention to the fact that it is quite distinct from the genus *HYSSOPUS* (which see), containing the popular potherb HYSSOP, which herb is referred to in our article on *POTHERBS*. *G. officinalis* is found wild all over Europe, and is a plant of very little value.

GRAVEL FOR PATH.: Amount Required.—See under VOLUMES in *ARITHMETIC AND GARDENING.*

GRAVELLY SOILS, Improving.—See *SOIL IMPROVEMENT.*

GRAVES, BEAUTIFYING.

We are often asked by amateurs who have lost friends as to the best way of beautifying graves in cemeteries and churchyards. Much has been done in the past on wrong lines. Climbing weeds of no value and little beauty, and coarse growing shrubs, have been planted on graves and have not only overgrown their proper limits, but have also spread on to and injured other graves.

Probably the most beautiful yet simple scheme for the winter planting of a grave is to fill it with spring flowering bulbs. Snowdrops at the outer edge, then such as Chionodoxas and Scillas; after these a few Hyacinths; then some Tulips of the May-flowering type; and in the centre either Trumpet Daffodils or paper-white Narcissi.

All these bulbs should be planted in October or November.

For summer planting we hold unorthodox views. The tendency nowadays is to plant in graves all manner of hardy herbaceous plants of rampant growth, which, though exceptionally lovely in borders, lose all their grace when packed close together in small areas. Personally, we would advise those who want to keep graves tidy and with a "cared-for" look on them to avoid such subjects, and revert to the old summer bedding pure and simple. A grave planted, for instance, with *Ageratum Heavenly Blue* dotted with plants of *Lobelia cardinalis* looks far better than one which is a mass of lupines, phloxes, sunflowers, and the like. A very gay display which will last all the summer is made if the grave is planted with *Geranium Paul Campbell*, dotted with *Fuchsia triphylla*, and edged dually with *Lobelia Blue Gem* and *Pyrethrum aureum*. A scheme which is curiously beautiful is easily carried out if the body of the grave is planted with *Geranium Mrs Pollock*, with two or three central dot plants of Golden Privet. An outer band of a good scarlet strain of *Phlox Drummondii* is then planted, after which the grave is edged with *Amarantus caudatus*.

These should be planted out at the end of May, the bulbs being lifted and dried off at the same time.

GRAY BIRCH (*Betula populifolia*).—See *TREES.*

GRAY POPLAR (*Populus canescens*).—See *TREES.*

GREASE BANDING.

Where fruit trees are not sprayed to check caterpillars, etc., it is almost essential to apply grease bands to keep the moths from crawling up the trees to lay eggs from which caterpillars are hatched.

Grease banding can be obtained from any good horticultural sundriesman ready for use, but if a supply is not available ordinary greaseproof paper, easily obtained at stationers, will do in the first instance. The trees to be banded are examined, and if the bark is rough and uneven the applications of the paper will be somewhat difficult if the moths are not to get underneath it. To obviate this get a quantity of soft putty and rub some of this into the bark of the trees about 5 ft. from the ground until a smooth surface has been produced. Then wind the paper round several times so that the band is 1 ft. wide.

Some people think that a 6-in. band is enough, but it is better to be on the safe side. Tie the band on with raffia, or stick down the ends with some non-soluble glue or prepared horticultural cement; and then smear each band thickly with cart grease or prepared grease, supplied by the trade.

It is very important, of course, to grease band the stake which supports the tree, otherwise the moths will crawl up it, and get on to the trees across the uppermost tie. This point is often overlooked by amateurs.

The best time to apply grease bands is early in September. They should remain on right through the winter, or, better still, until the end of April. They can then be removed, scraped, and the grease melted down again for use the following autumn.

Grease bands should be examined frequently during the winter, as some of the prepared greases are apt to set hard, and then, of course, the moths can crawl over the bands. If this takes place the grease should immediately be scraped off, remelted, and applied without delay. In some cases the addition of a small quantity of mineral oil will obviate this hardening.—E.

GREAT GOOSE-GRASS (*Asperugo procumbens*).—See *ASPERUGO*.

GREAT KNAPWEED (*Centaurea macrocephala*).—See *CENTAUREA*.

GREAT MULLEIN.—A synonym for MULLEIN, which see in *MEDICINAL HERBS*.

GREAT PILEWORT (*Scrophularia nodosa*).—See *FIGWORT*.

GREAT PUFF-BALL.—See EDIBLE FUNGI in *FUNGI: EDIBLE AND HARMFUL*.

GREAT RAGWEED (*Ambrosia trifida*). See *AMBROSIA*.

GREAT WATER DOCK (*Rumex Hydrolapathum*).—See *RUMEX*.

GREAT WILD VALERIAN.—See under VALERIAN in *MEDICINAL HERBS*.

GREATER BINDWEED.—A persistent perennial weed. For MEANS OF CONTROL see *WEEDS*; also *CALYSTEGIA*.

GREATER KNAPWEED (*Centaurea Scabiosa*). See *CENTAUREA*.

GREATER PLANTAIN.—A weed. See *PLANTAGO* and *WEEDS*.

GREEK ANEMONE (*Anemone blanda*). See *ANEMONE*.

GREEK FIR (*Abies cephalonica*).—See *TREES*.

GREEK or TALL JUNIPER (*Juniperus excelsa*).—See *TREES*.

GREEK VALERIAN.—The genus POLEMONIUM and *P. caeruleum*. See *POLEMONIUM*.

GREEN ASH (*Fraxinus chinensis* and *F. pennsylvanica lanceolata*).—See *TREES*.

GREEN CENTRE.—See ROSE GREEN CENTRE in *ROSE DISEASES*.

GREEN FLY.—See ROSE APHIDES in *INSECT PESTS*.

GREEN GRASS.—See *CHLORIS*.

GREEN MANURING.

This consists of the ploughing or digging in of some rapidly growing crop specially sown for this purpose. The practice is an old one, and is resorted to in one form or another all over the world. It is particularly valuable where the soil is deficient in humus and where dung or other organic manures are difficult to obtain. The best known instance of green manuring in this country is the ploughing in of the clover-ley preparatory to the sowing of wheat or winter oats, but as this crop is also grown for grazing and hay, it cannot be classed as a green manure crop pure and simple. There is little doubt that more use might be made of this means of enriching the soil, and it is well worth while for every cultivator to consider whether it cannot be profitably employed on his own land.

The object of green manuring is threefold: first, to add humus to the soil; secondly, to conserve the available food materials that might otherwise be washed out of the soil by rain; and thirdly, to enrich the soil by added nitrogen from the air.

It is obvious that a time when the land is free must be chosen for the growth of the green manure crop, *i.e.* it must take place between two regular crops, hence the term "catch crop" frequently applied to it. Thus the most suitable seasons are the autumn and winter. The green crop is sown as soon as the summer crop is off, or where possible between the rows of this crop before it is harvested, and is allowed to occupy the land until it is necessary to prepare it for the next crop, generally the following spring. Where land can be spared, the summer can, of course, with advantage be used for the growing of the crop which, when ploughed or dug in, makes an excellent manure for, say, autumn-planted cabbage or Seville (giant long pod) beans.

Another advantage of using the late summer and autumn for the sowing of the crop, beyond the obvious one of obtaining rapid growth which is, of course, essential, is that at this season of the year the soil is well stocked with food materials that have been made available during the summer by the action of the soil bacteria. A considerable portion of this food in the form of nitrates is liable to be lost in the autumn and winter rains when the land is bare; if, on the other hand, a crop is growing, it is taken up by the plants and thus conserved. It is obvious, therefore, for the reasons above stated, that the best and most convenient time to sow for green manuring is as soon as possible after the main summer crop, whatever it may be, can be cleared off the land, or before, if it can be done. The manure crop may be allowed to occupy the land through the winter where possible or until the land is required for the succeeding main crop.

The next point to consider is the most suitable crops to use for the purpose. Owing to the property possessed by the members of the natural order Leguminosæ of obtaining nitrogen from the air by the aid of the nodule bacteria that produce and inhabit the small nodules on the roots that are so characteristic of this order, it is obvious that, where possible, these plants should be employed. Vetches, clovers, and lupines are all suitable, and may be used in the garden. It must be borne in mind, however, that a most important consideration is the obtaining of a sufficient bulk of growth; that the growth be soft and sappy and not of a hard, woody nature; and, further, that it be such as is easy to plough or dig in. Vetches, while they cover the ground well and prevent the growth of weeds,—by no means an unimportant consideration,—are rather difficult to dig or plough in, and are apt to leave the ground very hollow in places, whereas clover and lupines, though not particularly quick or luxuriant in growth when planted late in the year, are otherwise preferable.

In view of these facts and especially when the ground can only be spared for a few months, quick-growing non-leguminous crops will often give the best return, and perhaps the most popular of all is mustard. This crop will produce a large quantity of the right type of growth in a very short time, viz. six or eight weeks, and is eminently suitable for sowing in the autumn. White turnips are extensively used, especially in Bedfordshire, and are also very suitable for the purpose. [Use about 2 lb. of either per statute acre.—EDITOR.]

Although it would seem that such non-leguminous crops hardly meet all the requirements we have mentioned, in that they do not enrich the soil with nitrogen obtained from the air, they do not, as a matter of fact, altogether fall short in this particular, because the carbohydrates (starch, etc.) that they contain are used by another bacterium that has the power of fixing nitrogen from the air. Consequently their presence in the soil increases the activity of this particular organism, and thus the soil is enriched by a different agency.

One of the great values of organic matter in the soil is its power of conserving water, which it holds like a sponge, and this is of particular importance to gardeners and fruit growers. While the organic matter obtained by green manuring will act in this way and be often very valuable in the spring and summer following its use, it must not be forgotten that during its growth the crop takes up a great deal of water which is passed out through the leaves and consequently lost to the soil. On damp soils and in parts of the country where the rainfall is high, this is all to the good, but on very light, dry soils in districts with a rainfall below 30 ins., it may be found that the practice renders the soil too dry in the following spring, and gardeners in such districts will be well advised when trying this means of enriching their soil to watch the last point carefully.

Except for the above possibility in certain districts there is nothing but gain to be obtained from the practice, and gardeners are therefore strongly recommended to try this simple and economical method of manuring their land whenever opportunity occurs—that is, whenever they find themselves in the late summer or early autumn with a patch of land that can be spared until the winter or early spring.—H. E. P. H.

See also *SOIL IMPROVEMENT.*

GREEN SPLEENWORT (*Asplenium viride*).—See *FERNS AND FERN GARDENING.*

GREEN VEINED WHITE BUTTERFLY.—See under CABBAGE WHITE BUTTERFLIES in *INSECT PESTS.*

GREEN VITRIOL.—See under SOME IRON COMPOUNDS in *IRON AND IRON COMPOUNDS.*

GREENBRIER (*Smilax rotundifolia*). See *SMILAX.*

GREENHOUSE ANNUALS.—See *ANNUALS FOR ALL PURPOSES.*

GREENHOUSE BUILDING AND HEATING.—Generally speaking, it is the greatest mistake for amateurs to attempt to build and heat their own greenhouses unless they are well acquainted with the principles of constructive work in brick, iron, stone, or wood, and thus to give details here would be beyond our present scope. There are so many ready-made greenhouses which are available comparatively cheaply, and so many ready-made heating apparatuses, that the amateur can get exactly what he wants without having to turn himself into a labourer. Greenhouse builders and heating experts advertise pretty regularly in the better class horticultural newspapers, some advertise in the more costly gardening books, especially those dealing with greenhouses or indoor flower and fruit culture, while very extensive lists are given in horticultural directories.

ROUGH GREENHOUSES may be erected on a basement of brick or stone work by letting a square pole in at each corner and nailing on ready-glazed frame lights, reared up along each of the four sides, fitting a door in, of course, at one end. Wood should be nailed along the top at both ends to slope down to each side, and the triangles so formed can have a glass substitute nailed over them to keep out the weather. A beam should be nailed across the top and smaller frame lights, or indeed old disused window frames can be nailed on, their tops to the beam and their bases to the top edge of the side lights. Such structures are very useful on allotments where it does not run to buying a ready-made greenhouse.—E.

GREENHOUSE : Cold and Unheated.—This is an unsatisfactory structure, and little can be said in its favour, as so few subjects can be grown in it on account of the fact that it is not frost-proof. Perpetual flowering carnations may be grown in it successfully, also many hardy plants and a variety of alpines which require glass in winter. The hardier ferns may also be grown. Anything, however, which cannot stand a few degrees of frost is quite out of the question. For further notes on the above subjects, see articles on *Alpine House*, *Carnation : Perpetual Flowering*, *Ferns and Fern Gardening*, etc.

GREENHOUSE AND CONSERVATORY : Roses for.—See under Roses for Greenhouse and Conservatory in *Roses for All Purposes.*

GREENHOUSE FERNS.—See *Ferns and Fern Gardening.*

GREENHOUSE: Foliage Plants for.—See *Foliage Plants for All Purposes.*

GREENHOUSE HEATING. — See *Greenhouse Building and Heating.*

GREENHOUSE: Management of.

The term greenhouse is a somewhat elastic one, for it is applied equally to structures from which frost is just excluded, as to those whose winter temperature varies from 45° by night to 60° by day. If a good display of flowers is to be kept up at that season, it will be necessary to maintain some such a temperature as that just named.

Greenhouses are often erected in very ill-suited surroundings, either their position or structure, for the successful culture of plants, being at fault. As at times they are built against a high wall, it is almost impossible to grow symmetrically shaped plants, while they are frequently so lofty as to cause the occupants to draw up tall and weak. Both these disadvantages are quite commonly to be met with in the so-called conservatories attached to dwelling-houses. They are only too often death-traps for plants, rather than buildings designed for their successful culture.

The most desirable form of greenhouse is that with a span roof, as it admits of an equal distribution of light on all sides of the plants. Provision should be made for ventilation both at the top and sides. The height of the structure will, of course, depend upon the size of the plants for which it is intended, and the interior arrangements according to its width. A house 10 ft. wide may have a central path of 3 ft., and stages of 3½ ft. on either side. Structures of greater width are best with a central stage or bed, and a path around the side stages as before. Such a greenhouse allows accommodation for small plants at the sides and taller ones in the centre. The uses to which a house of this class may be put will now be dealt with under the different seasons.

The Greenhouse in Spring.—Early in the spring the chief floral display is kept up by means of bulbs of different kinds, by Carnations, Cyclamen, the most forward of the Primulas, Indian Azaleas, and various hardy plants, including shrubs that have been gently forced. Some of the shrubby Begonias too will supply a welcome bit of colour, and to these may be added greenhouse Heaths and various other subjects. Later on come Calceolarias, Cinerarias, Hippeastrums, or Amaryllis, as they are generally called, Pelargoniums, etc.

Cultural details in the spring are many and exacting, for seeds of various kinds have to be sown, and a great number of plants need repotting at this season. Fuchsias that have been dormant all the winter will need to be trimmed into shape, and encouraged to grow by watering and occasionally syringing them. Tuberous Begonias for the summer display, with Gloxinias and Achimenes, must be started into growth, Cannas divided, and Pelargoniums put into their flowering-pots. Summer-bedding plants that have been wintered in boxes will need to be potted singly, while cuttings of various things must be put in, especially plants intended for autumn and winter blooming. In this class must be included Carnations, Chrysanthemums, Eupatoriums, Salvias, and others. This by no means exhausts the list of work to be done where a miscellaneous collection of plants is grown.

As the spring advances the sun gains power, hence it will be necessary to shade the plants that are blooming as well as young seedlings, cuttings, and all kinds of tender subjects. Different methods of shading are adopted. The glass is sometimes painted over with a preparation known as Summer Cloud, but by far the better plan is to use blinds fixed on rollers, so that they can be drawn up when not required. If left on during the winter, these blinds are of great service when let down during frosty nights. What with the brighter weather and the plants being in active growth they will need an increased amount of water. Syringing, too, on the mornings of hot days will be beneficial, provided that plants in flower are not wetted overhead. Lastly, a sharp look out must be kept for insect pests, especially aphides or green fly, which, if unchecked, make rapid headway in spring. They can be readily destroyed by vaporising with nicotine.

The Greenhouse in Summer.—At this season of the year the greenhouse will as a rule be at its very best. The masses of flowers of all kinds yield a wealth of colour that will gain the admiration of every one.

Only to mention a few, there are such well-known subjects as Begonias, especially those of the tuberous rooted section, Fuchsias, Gloxinias, Heliotropes, Lilies, Petunias, and quite a host of other flowers. Where space exists for hanging-baskets there are several summer blooming plants that are seen to great advantage treated in this way. Among them are Achimenes, drooping varieties of the tuberous-rooted Begonia, the different forms of *Campanula isophylla,* Ivy-leaved Pelargoniums, with Tropaeolums and other flowers.

With regard to cultural details at this season, the first important matter will be to provide increased accommodation for the different plants that are in full growth. Fortunately many of those that were wintered in the greenhouse may be placed outside during the summer months. It is very essential that they are well supplied with water, as plants dry quickly when outside. If they can be plunged in beds of cocoanut refuse or ashes, the risk of injury from drought will be much lessened. The space thus provided will be of great service for the growing and flowering plants. Where staking is necessary it should be done in a quiet and unobtrusive manner, using no more ties than are absolutely necessary for the actual support of the plants. No fire heat will be required during the summer. At this season, especially if the weather is hot, the plants dry quickly. The best time to water is in the evening, as the roots of the plants have then a much longer time in which to absorb the moisture. Many of the flowering subjects will be greatly benefited by an occasional dose of some stimulant. Weak liquid manure and soot water combined is very good for the purpose, and in addition there are many plant foods now to be obtained from horticultural sundriesmen.

The Greenhouse in Autumn.—During the early part of the autumn a great many of the plants that have been flowering throughout the summer will continue their display, with others in addition. Prominent among these are the Agapanthuses, *Crinum Moorei*, *Crinum Powellii*, Nerines, and *Vallota purpurea*.

As the season advances Chrysanthemums, Eupatoriums, and Salvias will come into bloom. The different hybrids of *Begonia socotrana* are very showy too at that season. The treatment required by the plants in the greenhouse at the beginning of autumn will be much the same as in the summer. As the season advances less water and less shading will be required. The watering must then be done in the morning in order to allow time for any superabundant moisture to dry up. Should frost put in an appearance, the outdoor plants must be brought under cover. A little fire heat will at times be necessary.

The Greenhouse in Winter.—This is commonly regarded as the dull season of the year, but though the number of plants in flower is considerably less than in the summer, the greenhouse may even then be kept gay. Among the flowers are some of those mentioned in the autumn, and in addition Arum Lilies, early Indian Azaleas, Chrysanthemums, Cyclamen, Freesias, Heaths, Paper White Narcissi, Poinsettias, Primulas of sorts, Zonal Pelargoniums, and others. The bright red berries of *Solanum capsicastrum* also form a very attractive feature. The cultural requirements for the winter months are much less than at other seasons. Potting is practically at a standstill, as the roots of the plants should not be disturbed during the winter. The chief aim must be to combat the unfavourable weather so often experienced. If wet, cold, and foggy, a gentle heat in the hot-water pipes combined with a little air on the top of the structure will help to keep the atmosphere light and buoyant, conditions so needful for flowering plants. All dead flowers should be removed, as they are apt to set up decay.

Watering must be done in the morning, and care taken not to spill more water about than is absolutely necessary. In the event of severe frost the better plan is to allow the plants to be quite dry before watering them. Advantage should be taken of the blinds if there are any available. Should frost penetrate into the structure, the temperature must not be rushed up all at once, but allowed to rise gradually, the glass being meanwhile covered so that the plants are in the dark. So treated, many tender subjects will come through such an ordeal without injury.—W. T.

GREENHOUSE AND STOVE PLANTS DISLIKING LIME. — See *LIME HATERS.*

GREENHOUSE: UNHEATED.—See *GREENHOUSE: COLD AND UNHEATED.*

GREENHOUSES : CUBICAL CONTENTS OF. — See CUBICAL CONTENTS OF GREENHOUSES under VOLUMES in *ARITHMETIC AND GARDENING.*

GREENHOUSES AND FRAMES : **Types of.**—No garden is complete without glass, and in the suburban garden or on the allotment it is difficult to cultivate vegetables or flowers successfully without it. Greenhouses and propagating frames can be made by the amateur, or purchased complete and ready for fixing. The best materials should be used ; good 21 oz. glass, and strong metal fittings, also the best white lead paint (see article on *PAINT AND THE GARDEN*) are essential. A few of the more important types are described below :—

Cucumber Frames.—These frames, portable and of handy size, are usually sold according to the number of sliding lights they contain. These are about 4 ft. wide, the standard length being 6 ft. Thus we have a "one-light" "two-light," or "three-light" frame.

Cucumber and Tomato Houses.—Greenhouses specially constructed for growing either cucumbers or tomatoes are steep pitched ; the height of the sides is about 3 ft., the ridge rising to a height of 7 ft. The base woodwork should be grooved and tongued and well made, ample provision for ventilation being, of course, allowed for. Such houses are very suitable for preserving plants and cuttings during the winter.

Forcing Frames.—Forcing frames can be made like MELON FRAMES (see below), but higher, and with glass ends if desired. They are similar to the upper part (built on brick) of a forcing pit.

Lean-to Greenhouses.—The greenhouses sold by specialists ready for fitting together are sometimes called TENANT'S LEAN-TO GREENHOUSES, in that they are tenant's fixtures and can be removed at will. Amateur carpenters can, however, erect quite good houses which answer well and add to the appearance of a garden, and are exceedingly useful. Preferably well-seasoned red deal should be used, and in building them the joints should be mortised and tenoned. There should be ventilating lights in the front and roof. The stage for plants should be of stout and ample laths, suitably spaced, with shelves or light deputy stages for small pots. Approved sizes are 8 ft., and 12 ft., by 6 ft. ; also 12 ft., and 12 ft., by 7 ft.

Melon Frames. — For growing melons, three-quarter span frames are recommended. Those with two or three lights of the usual size (see CUCUMBER FRAMES above) are the best for general use. These frames are also handy for other purposes and for winter preservation of plants.

Span-roof Greenhouses. — These are tenant's fixtures, and, like lean-to greenhouses, should be made of seasoned red deal, well jointed and fitted, also glazed with 21 oz. glass. It is much better to buy these ready-made, complete for fitting together, and primed for painting. The following are all well-proportioned sizes : 8 ft. by 6 ft. ; 12 ft. by 8 ft. ; and 16 ft. by 10 ft.

One- and two-light border frames are also useful in a garden and answer many purposes.

Among sundry frames and lights useful for many purposes may be mentioned cup glasses, oblong lights, and seed protectors with zinc frames.

F. W. B.

GREENS : Winter and Summer.

Winter Greens include most of the members of the cabbage tribe which are planted out in June and July to stand for part or the whole of the winter. The exceptions are found in Celery Cabbage, Couve Tronchuda, and Kohl Rabi, the leaf portion of which is used during the summer and autumn. Summer Greens consist largely of Spring Cabbages, which are planted in August in firm ground. The vegetables Spinach Beet, Perpetual Spinach, etc., though giving greenstuff both in summer and winter, do not come within the term summer and winter greens. It may be pointed out that greens are not nearly so necessary in summer as in winter, owing to the abundance of other crops from May to October, though many of us would be sorry to be without the sweet white cabbages so freely cut in June and July.

Cauliflowers, though often termed Winter Greens, do not come within the strict meaning of the term, owing to the fact that the heads find different purposes in the home to Broccoli, Brussels Sprouts, Cabbages, Kale, and so on. The term winter green used to be limited to Broccoli, Curled Greens, and Kale, but of late it has come, as we have already mentioned, to include all the members of the great Cabbage or Brassica Family with the exceptions named.

Culture of Greens.—Full details of growing greens will be found under *Borecole* for Curled Greens and Kale, and under the separate articles on the vegetables named above. Two points of special importance may be mentioned, however; first, that planting of all kinds of greens in drills is strongly advised for the dual purpose of conserving moisture and enabling more thorough earthing up; and secondly, that all greens whether for the summer or winter should be planted in firm ground, each individual plant being made very firm. This will mean the plants will stand through the winter much better, and will not grow long and leggy in the summer.

Winter Greens should never be fed with nitrogenous fertilisers after the 1st of August. Summer Greens can have weak liquid manure given them throughout the summer and will in return be of greatly improved quality.

Clubroot.—All greens are very liable to clubroot disease, and if the land is badly infected many thousands of plants will fail. The attention of all readers is drawn to the article on *Diseases of Plants* by a well-known expert, and if the suggestions contained in it under Clubroot are carefully followed, this disease, otherwise a serious menace, will be kept well in control, and in all probability completely cured.

Pests.—Greens are very liable to attacks of the Cabbage Root Fly and Maggot as well as other pests. The reader should turn to our expert's article on *Insect Pests* for the methods of control.—E. T. E.

GREVILLEA (Nat. Ord. Proteaceæ).—This is a greenhouse evergreen shrub, with ornamental foliage useful for decorative purposes. It is propagated by cuttings of well-ripened young shoots in sandy soil under a bell-glass with slight bottom heat, also by seed in spring in heat. Peat loam and sand is a suitable soil. Temperature required, 40–50° F.

Greenhouse Species.—*Grevillea Forsteri.*—Bright red trusses. Flowers in June. Height, 1–2 ft.

G. Manglesii.—Green ornamental foliage, and white flowers in May. Height, 1–2 ft.

G. Preissei.—Deep red, yellow at tip. Flowers in June. Height, 1–2 ft.

G. robusta.—Fern-like foliage, and orange flowers in June. Height, 1–4 ft.

GREY ALDER (*Alnus incana*).—See *TREES.*

"GRIDIRON" TREES.—See under PLANTING DISTANCES in *FRUIT CULTURE: HARDY.*

GRINDELIA (GUM-PLANT OF CALIFORNIA. Nat. Ord. Compositæ).—About twenty half-hardy and hardy biennial and perennial species of this exist, most of them being yellow flowered. They are easy plants to grow provided winter protection is given, but are not as attractive as some.

Biennial Border Species.—Two only are worthy of culture, and neither of these figure in the *Kew Hand-list.* They may be raised by sowing seed in the spring or autumn in an unheated greenhouse or frame, after which the plants are put in their permanent positions outside in May.

Grindelia ciliata.—This is a hardy yellow August-blooming plant about 1½ ft. high.

G. grandiflora.—This bears large orange or orange-yellow flowers throughout the summer, and grows 2½–4 ft. high.

Perennial Border Species.—The following may be grown in common garden soil in the ordinary manner for perennials, but slight winter protection should be afforded, and planting in cold districts deferred until late March or early April:—

Grindelia glutinosa.—This bears pretty yellow flowers in August, and grows 2–5 ft. high.

G. inuloides.—This bears yellow flowers in August, and grows 2–5 ft. high.

G. lanceolata.—This is a useful yellow sort blooming all the summer, and averaging 2 ft. in height.

G. squarrosa.—This sort bears yellow flowers in August and September, on plants 2–4 ft. high.

GRISETTE.—See EDIBLE FUNGI in *FUNGI: EDIBLE AND HARMFUL.*

GROMWELL.—See *LITHOSPERMUM.*

GROSS-FEEDING CROPS.—See *KINDS OF CROPS.*

GROUND-BEETLES. — See under BEETLES in *INSECT FRIENDS.*

GROUND CHERRY (*Prunus Chamaecerasus*).—See *TREES.*

GROUND or COMMON WASP.—See under WASPS in *INSECT PESTS.*

GROUND IVY (*Nepeta Glechoma*).—See *CATMINT.*

GROUND TISSUES.—See under TISSUES in *PLANT PHYSIOLOGY.*

GROUNDSEL. — A common annual weed. See *WATER GARDEN: PLANTS FOR THE,* and *WEEDS.*

GROWTH.—See *PLANT PHYSIOLOGY.*

GRYLLOTALPA.—See MOLE CRICKET in *INSECT PESTS.*

GUANO.

No sensible gardener should be blind to the benefits which result from the use of good guano. Of natural fertilisers, it is, when of good sample, as near a perfect fertiliser as one can have, but unfortunately it is often very much adulterated.

The three best kinds are Fish Guano, Native Guano, and Peruvian Guano.

Fish Guano, as its name implies, is made on the coast from waste fish. It is a powerful phosphatic fertiliser useful as a liquid manure for cucumbers, herbaceous plants (especially Sweet Peas), tomatoes, and vegetables (especially peas and beans). Two ounces of this fertiliser can safely be hoed into each square yard of ground, or the same quantity stirred up with a gallon of water applied to that area. In coast places it should be very cheap at the works and should be very largely used; inland if Peruvian Guano can be had at the same rate Fish Guano should be left alone.

Native Guanos are not very soluble manures. They are largely made at sewage works, and in their pure state should be a fine, dry, almost odourless powder. More care should be taken than is at present at the works to see that they contain the highest possible proportion of soluble matter. Native Guanos are rich in soluble organic matter, and sometimes are very rich in lime—it rather depends on the process of manufacture. The plant-food is not immediately available, so they can safely be used in the late winter or early spring as manure for vegetable crops. As the organic matter they contain is chiefly nitrogen, the guanos should not be used overmuch for crops which are not grown for their leaves. They can be used at the rate of 1 lb. per each square yard.

Peruvian Guano is certainly when pure by far the best of all the guanos. It is a perfect fertiliser—or as near such as we can get, for it supplies soluble nitrogen, phosphates, and a little potash. It is probably used more as a phosphatic fertiliser than as a general one, but it should always be regarded as a general fertiliser. We cannot call to mind at the present time any single plant which does not improve enormously if a little guano is applied to it.

This guano, as its name implies, comes from Peru. It is, strictly speaking, the excreta of numerous sea-birds. To test its purity, heat a weighed quantity on a shovel, as advised in the article on *Ammonia*, and if nearly half of it vanishes the sample is rich in organic matter. Shoot the remainder into water. Stir, filter, dry, and weigh. If half this has dissolved the sample is good. If practically none has dissolved shoot the dry material into 2 per cent. citric acid solution, stir, filter, dry, and weigh. If the weight is the same as before, or very nearly so, reject the sample as impure.

Peruvian Guano, though rather expensive, is when pure well worth its cost. As it is very frequently adulterated with crushed bones, normal or in some cases mineral phosphate of lime, the above test should in every case be applied. It can be used in a similar manner and in similar quantities to Fish Guano.

On the market at the present time there is a compound known as *Dissolved Guano.* This contains very little organic matter and hardly any potash; it is mostly mono-calcium orthophosphate. As it is very expensive the gardener should avoid it.

All guanos should be kept in a dry place. The organic matter they contain reacts with moisture to form soluble or gaseous nitrogen compounds, and these compounds are quickly lost by exposure. Barrels with well-fitted lids or well-covered earthenware jars are the best receptacles for storing guanos in.—E. T. E.

GUELDER ROSE (*Viburnum Opulus*). See *Shrubs*.

GUERNSEY ELM (*Ulmus campestris sarniensis*).—See *Trees*.

GUERNSEY LILIES (*Nerines*, Nat. Ord. Amaryllidaceæ).—The Guernsey Lilies are a magnificent family of bulbous plants from South Africa. They are to September and October what the Tulip is to April and May. They bear brilliant flowers with narrow recurving and frequently crinkled segments of some shade of red, salmon, pink, or white, in umbels on wiry footstalks from 15–20 ins. high. In a few varieties, as in *Lady Bromley*, a grey colour develops with age, and makes a pleasing change from the all pinks and reds. The true and original Guernsey Lily (*Nerine sarniensis*) is very shy flowering, and as it is an old inhabitant of our greenhouses, it has given the whole family a bad name in this respect. Now, however, there is an immense change for the better, and some of the more recent hybrids flower practically every year if the essential and simple details of culture are observed. A peculiar character of the flowers is that they shine as if made of tinsel, or sparkle as if powdered with diamond dust, either in sunshine or under artificial light. Thanks to the improvements recently made by hybridists in their free flowering properties, in the extension of their range of colour, and in the size of the blooms, the race is rapidly gaining favour.

Culture.—The bulbs like a good, rich virgin loam, to which has been added some sharp silver sand and a small amount of leaf-mould. They must not be over-potted, as they flower best when pot-bound. One large bulb in a 4½-inch pot, or three bulbs in a 6-inch pot, is about right for all the varieties except the *pudica hybrids*, which do well in smaller pots. Repotting is only necessary every third or fourth year. The best time for the operation, or for buying new bulbs, is early August, just before the flower stems begin to appear. Guernsey Lilies, with the exception of *Nerine Bowdeni*, which in the Southern parts of the British Isles may be planted outside in a warm border under a south wall, are not hardy, and require the protection of a cool greenhouse during winter, with a temperature of about 45–55° F. They flower from the beginning of September to the end of November. The details of their management are as follows: As soon as the tips of th sheaths of the flower heads appear, water must be given, and later on, when they are in full flower, and the green leaves are in evidence, regular feeding is necessary. This must be continued all winter, until in May the foliage turns yellow, when water must be gradually withheld. During June and July the plants must be kept quite dry and fully exposed to the sun until once more the tips of the flower stalks appear. Their flowering depends on the care taken of the bulbs all the winter after they have flowered, and the annual summer baking. Given these, Guernsey Lilies may be counted upon to give satisfactory results. If a small greenhouse could be given up to them, so that there would be no other plants to be considered, the gorgeous sight every September, October, and November would, we think, be amply sufficient to repay the owner for his care.

Seeds are freely produced if the flowers are hand fertilised. It is important to know that they always look green and unripe. They may, however, be gathered when they naturally begin to drop off, and then they should be *thinly* sown at once in pans or pots. They germinate in from five to eight weeks. Seedlings may remain where sown for two years, when each bulb should be put in a 3-inch pot, and grown on in it until it flowers.

Species and Varieties.—*Nerine Bowdeni* has large pink flowers, and is nearly hardy. Its variety *alba* is white.

N. Epic is a bright rose-pink variety.

N. Fairy Queen has narrow petals of soft pink colour.

N. flexuosa alba is quite similar, but pure white.

N. Fothergillii major has flowers of salmon-scarlet. It is very fine, and is generally the first to flower in September.

N. Glory of Sarnia produces immense orange-scarlet flowers.

N. Lady Bromley has flowers of rosy-pink, which develop lines of slate colour with age. It is very effective.

N. Lady Carrington is a pale rose and white sort.

N. Lady de Walden is a bright rose.

N. Lady Mary Shelley produces clear pink flowers and is very free blooming.

N. Manselli is a late flowering rosy-pink variety, blooming in November.

N. Meadowbank bears large orange-red flowers.

N. Miss Willmott is a fine glowing scarlet.

N. Mrs H. J. Elwes produces delicate pink flowers with deeper colour at the base of the petals.

N. Mrs Hooker bears rose and white flowers.

N. Rosebud has white flowers which pass into deep rose.

N. Rotherside bears fine orange-salmon flowers.

N. sarniensis is the original Guernsey Lily with rose flowers. It is a shy bloomer.

N. sarniensis corusca is an attractive scarlet.

N. undulata (Syn. *N. crispa*) has narrow petals and rosy or pink flowers.

All the above flower in September, October, or November, according to the temperature of the house in which they are growing, and average 15–20 ins. in height.

J. J. & E. T. E.

NEW VARIETIES.

Nerine Esconia has large carmine pink flowers, and *N. Vivia* is fiery scarlet.

GUINEA CORN.—See *SORGHUM*.

GUINEA-FOWL MANURE. — See *POULTRY MANURE*.

GUINEA WHEAT (*Zea Mays*).—See *ZEA*.

GUM.—See *EXHIBITORS' GUM*.

GUM CISTUS (*Cistus ladaniferus*).—See *SHRUBS*.

GUM-PLANT OF CALIFORNIA.—See *GRINDELIA*.

GUM TRAGACANTH (*Astragalus massiliensis*).—See *ASTRAGALUS*. See also *Astragalus Tragacantha* in *SHRUBS*.

GUM TREE.—The genus EUCALYPTUS. See *TREES*.

GUM TREE: AUSTRALIAN. — See *EUCALYPTUS*.

GUMMING OF FRUIT TREES.—See under GUMMOSIS in *DISEASES OF PLANTS*.

GUMMOSIS. — See *DISEASES OF PLANTS*.

GUNNERA (Nat. Ord. Haloraginaceæ).—This is a genus of striking foliage perennials, the flowers of which are small and of little value. Culture is easy, as they thrive in a good ordinary garden loam provided this can be kept reasonably moist. As they are not quite hardy in cold districts, a mound of leaf-soil, cocoanut fibre refuse, or even coke ashes over their root-stock from November to February is advisable. They are best propagated by root division in the usual way, but may also be raised by summer sown seeds.

What to Grow.—A large number of species have been described, and of these we cordially recommend the following :—*Gunnera bracteata*, *G. chilensis* (Syn. *G. scabra*), *G. densiflora*, *G. magellanica* (Syn. *G. falklandica*), *G. manicata*, *G. monoica*, and *G. perpensa*. The *Gunnera maculata* of nurserymen is probably a corruption of the name *G. manicata*. The height of these plants averages 2–6 ft.

GYMNADERIA.—Now included in the genus HABENARIA.

GYMNOGRAMME. — For the best species and varieties see *FERNS AND FERN GARDENING*.

GYMNOTRIX.—Now included in the genus *PENNISETUM*.

GYNANDRIRIS.—Now included in the genus *IRIS*.

GYNERIUM (Nat. Ord. Gramineæ). This genus has now been united with *CORTADERIA* (which see) by the Kew authorities. The only species of any importance is *G. argenteum*, now *C. argentea*, the well-known PAMPAS GRASS, which is retained under the first name in our article on *ORNAMENTAL GRASSES*, as this name is so much better known and much more generally used.

GYPSOPHILA (CHALK PLANT. Nat. Ord. Caryophyllaceæ).—There are several useful hardy annuals in this genus of elegant plants, and their slender stems and lightly poised flowers make them very popular where cut flowers are in much request for home decoration. Where there is a great demand for the latter purpose and for marketing, sowings should be made in autumn and in early and late spring in moderately good soil. Thin sowing is desirable if the plants are grown in borders or beds, for effect, and some slender twiggy Birch branches should be placed among them to prevent damage by wind or rain. Thicker sowing in rows 6–12 ins. apart will suffice if the plants are to be cut for decorating.

Annual Species.—Below we briefly describe the best :—

Gypsophila elegans.—A white species flowering in the spring, summer, and autumn, according to time of sowing seeds. There is a pink variety *G. e. rosea*, and a large-flowered strain of the type is sometimes offered as *G. e. grandiflora*. Height, 15–18 ins.

G. muralis (Syns. *G. agrestis*, *arvensis*, *purpurea*, and *serotina*).—A pink summer flowering sort useful in the rock garden. Height, 6 ins.

Perennial Border Species.—These are useful light growing garden plants, thriving in ordinary light loam containing lime. They are easily propagated by division of the roots in the autumn or spring. We recommend the following :—

Gypsophila acutifolia.—This is a white July flowering species about 1 yd. high.

G. arenaria.—A synonym of *G. fastigiata*, which see.

G. collina.—Syn. *G. fastigiata*.

G. fastigiata (Syns. *G. arenaria*, and *G. collina*).—A white June flowering species about 1½ ft. high.

G. grandiflora.—This is a white June-blooming sort growing about 2 ft. high.

G. paniculata.—Probably this is the most popular of all hardy perennial Gypsophilas. Its white flowers borne in July, August, and September are most useful for cutting. The plant averages 1 yd. in height. The double variety *G. p. flora plena* is quite as useful as the single form.

G. perfoliata.—This bears bright reddish flowers from July onwards, and averages 2 ft. high.

G. prostrata.—This is a deservedly popular sort for edging purposes. It bears attractive little red flowers from August onwards, and averages about 9 ins. in height.

G. repens.—This, described under rock garden species, is also useful for edging purposes in perennial borders.

G. tenuifolia.—This bears red flowers from July onwards, and averages 12 ins. in height.

Rock Garden Species.—These are light graceful perennials and thrive in light sandy loam with limestone added. They are propagated by division of the roots in the autumn or spring. We recommend the following :—

Gypsophila cerastioides.—This is one of the dwarfest, and of tufted habit. Flowers white with red veins. Site open. Flowering Period, May to September. Height, 3 ins.

G. repens.—This has prostrate stems. Flowers white in sprays. Site sunny. Flowering Period, June to September. Height, 3 ins. Its variety ***rosea*** has pink flowers.

*G. **transsylvanica.***—This plant has tufted growth and leaves. Flowers whitish, in heads. Site sunny. Flowering Period, June to July. Height, 3 ins.

GYPSUM.

Gypsum is hydrated sulphate of lime ($CaSO_4 . 2H_2O$). Its uses in the garden are somewhat limited, but worth recognising. Its chief value on the land itself is as a purifier, and if the rich and frequently sour soil of an old garden which has been heavily manured with dung for years be dressed with Gypsum alone for a season at the rate of 4–8 oz. per sq. yard, a vast improvement will be seen in the crops. Apply in the autumn and early winter.

Gypsum has also another use, namely, for "fixing" ammonia in dung heaps. This property is also possessed by Kainit and certain other potash manures, but a very large quantity has to be used. That is not so in the case of Gypsum. The crushed material is sprinkled fairly thickly over the outside surface of the heaps (not mixed with it as is so often advised), and then fixation takes place.

Gypsum is found in several artificial fertilisers, notably superphosphate of lime, and dissolved bones. Its presence there is accounted for by the use of sulphuric acid to reduce the tri-calcium orthophosphate of which bones and coprolites largely consist, into soluble mono-calcium orthophosphate. As it is only very sparingly soluble in water, its use is greatly limited, but still it should not be wholly overlooked.—E.

GYPSY WORT, or GIPSY WORT.—See *LYCOPUS.*

H

HAAST'S DAISY BUSH (*Olearia Haastii*).—See *CLIMBING AND TRAILING PLANTS.*

HABENARIA.—See *ORCHIDS.*

HABERLEA (Nat. Ord. Gesneraceae). A genus of tufted plants with leaves in rosettes, suitable for growing in the shady parts of the rock garden in rocky crevices. They are propagated by division of the crowns in the autumn or spring. Only one species is usually grown.

Haberlea rhodopensis. — Leaves deep green, with corrugated edges. Flowers lilac, with pale yellow throat, tubular. Site Shady. Soil sandy peat. Flowering Period, June to July. Height, 4–5 ins. Varieties of this are *H. Ferdinandi Coburgi*, with larger flowers and lighter green leaves, and *H. virginalis*, with pure white flowers.

HABRANTHUS (Nat. Ord. Amaryllidaceæ).—Although now referred by botanists to the genus Hippeastrum, in gardens Habranthus is still retained as a separate genus, and *H. pratensis* is grown as a half-hardy or greenhouse bulb to some extent. It is not of difficult culture, thriving in ordinary light loamy soil in a temperature of 65–75° F. Several forms are available, with cream-yellow, dark red, and scarlet and yellow flowers. The plant blooms in May, and grows about 12 ins. high.

HACKBERRY (*Celtis occidentalis*).—See *TREES.*

HACQUETIA (Syn. *Dondia.* Nat. Ord. Umbelliferæ).—A curious and pretty spring-flowering rock plant. It is propagated by division of the roots in autumn or spring, and thrives in a moist half-shady position. The most desirable species is :—

Hacquetia Epipactis.—Very dwarf. Flowers yellow, in umbels surrounded by yellow-green leaves. Flowering Period, March to April. Height, 3 ins.

HAILSHAMBERRY. — See *BRAMBLES AND BERRIES.*

HAIR AS MANURE. — See "Waste Hair" in our notes on ORGANIC PRODUCTS under NITROGENOUS MANURES in *MANURES.*

HAIR GRASS.—See *AIRA.*

HAIR-MORTAR.—See *MORTAR.*

HAIRYFOOT. — See HARMFUL FUNGI in *FUNGI: EDIBLE AND HARMFUL.*

HAIRY PINK (*Dianthus hirtus*).—See *DIANTHUS.*

HALESIA.—For the best species see *SHRUBS.*

HALF-HARDY ANNUALS.—See *ANNUALS, HALF-HARDY : LIST OF.*

HALF-HARDY CLIMBERS. — See under ANNUAL CLIMBERS and PERENNIAL CLIMBERS in *CLIMBING AND TRAILING PLANTS.*

HALF-HARDY EDGING PLANTS.—See *EDGING PLANTS : HALF-HARDY.*

HALF-HARDY FERNS.—See GREENHOUSE and HALF-HARDY FERNS in *FERNS AND FERN GARDENING.*

HALF-HARDY PERENNIALS.— See *PERENNIALS, HALF-HARDY : LIST OF.*

HALF-SHADE, ROCK PLANTS FOR. See ROCK PLANTS FOR HALF-SHADE in *ROCK PLANTS FOR ALL PURPOSES.*

HALIMODENDRON.—For the best species see *SHRUBS.*

HAMAMELIS.—For the best species see *SHRUBS.*

HAMBURGH PARSLEY.—See *PARSNIP-ROOTED PARSLEY.*

HAMMER SEDGE (*Carex hirta*).—See *CAREX.*

HAMMOCKS.—See *GARDEN FURNITURE.*

HANDSWORTH NEW SILVER HOLLY (*Ilex Aquifolium handsworthensis*). See *HOLLY*.

HARD FERN (*Lomaria Spicant*).—See *FERNS AND FERN GARDENING*.

HARD FESCUE (*Festuca duriuscula*). See *FESTUCA*.

HARD FRUITS.—See *KINDS OF CROPS*.

HARD WOODED SUBJECTS.—See *CONSERVATORY*.

HARDENING OFF.

The immense importance of thoroughly hardening plants off before they are planted out in their permanent position is not fully realised by gardeners. Hence we see bedded out borders spoilt because the plants have by cold been suddenly checked, whereas, if they had been gradually inured to the weather, no drooping and no losses would result.

For hardening off, cold frames or open-work frames are indispensable. First of all, the boxes of seedlings, cuttings, or the pots of plants, should be transferred from a warmer to a colder part of the greenhouse, and given any amount of air; after a week or two of this they should about the middle of May be transferred to frames without heat for a fortnight, these frames being left more and more open each night, except when there is actual frost; and finally they should be put into open-work frames, which are really framelights supported on wooden poles, for a few days. The air and wind will thus play all round them.

Plants so treated get gradually used to their changed surroundings, and can be safely planted out in the flower borders in June without the least fear of a check due to cold resulting. (See also *BEDDING OUT: PRACTICAL HINTS ON*.)

Hardening off is equally important in the case of vegetable plants raised in the greenhouse for outdoor work. Neglect of it may mean that the crops thus sown do not reach maturity until after those sown out of doors, for a sudden change of temperature will throw them back many weeks as regards growth.—E. T. E.

HARDHACK (*Spiraea tomentosa*).—See *SHRUBS*.

HARDY ANNUALS.—See *ANNUALS FOR ALL PURPOSES*, and *ANNUALS: GENERAL CULTURE OF*.

HARDY AZALEAS.—See *AZALEA: HARDY SPECIES*.

HARDY CLIMBERS.—See under ANNUAL CLIMBERS and PERENNIAL CLIMBERS in *CLIMBING AND TRAILING PLANTS*.

HARDY FERNS.—See *FERNS AND FERN GARDENING*.

HARDY FERNS FOR NORTH BORDERS.—See *NORTH BORDERS: SOME PLANTS FOR*.

HARDY FLOWERS FOR CITY GARDENS.—See *TOWN AND CITY GARDENING*.

HARDY FRUIT CULTURE.—See *FRUIT CULTURE, HARDY: GENERAL CONSIDERATIONS*.

HARDY ORANGE.—A name applied to the genus ÆGLE. See *SHRUBS*.

HARDY ORCHIDS.

There are many beautiful Hardy Orchids which may be grown in gardens, either in half-shady portions of the rock garden, or in the fern border where such members of the family as the Lady's Slipper (*Cypripedium*) and others will thrive. The different genera, of which there are over twenty, are found growing all over Europe. Many are also found native in England. In the present work it is only proposed to deal with those that are fairly easy to grow, omitting altogether those of smaller value from a garden point of view.

Cypripedium.—This is a large family popularly known as the LADY'S SLIPPER ORCHIDS and contains many fine plants. Most of them thrive in well-drained soil rich in humus, but others, such as *C. Calceolus* and *C. macranthum*, prefer a loamy soil of a calcareous nature. All prefer half-shady situations, amongst other low-growing plants. The best species are :—

C. acaule.—Syn. *C. humile*, which see.

C. Calceolus.—This bears brown and yellow flowers from May to June, and grows about 18 ins. high.

C. californicum.—This is a smaller plant with yellow petals and white lip spotted with brown. It blooms from May to June, and grows about 9–12 ins. high.

C. candidum.—This in general habit is like the above, but with white flowers.

C. hirsutum.—Syn. *C. parviflorum*, which see.

C. humile (Syn. *C. acaule*).—This bears large rosy-purple flowers in May, on plants 3–6 ins. high.

C. macranthum.—This is a strong handsome species bearing large rich purple-rose flowers in May. It grows nearly 2 ft. high.

C. montanum.—This species bears brownish-purple and white flowers in May and June, three or more flowers on each stem, and is nearly 1 ft. high.

C. parviflorum (Syn. *C. hirsutum*). —This bears brown, purple, and yellow flowers in May, on stems up to 2 ft. high.

C. pubescens.—This is similar to the above but with larger flowers of yellowish-brown and yellow colour also in May.

C. spectabile (Syn. *C. Reginæ*).—This is one of the finest sorts with large white flowers shaded with rose on the lip. It blooms in June, and grows about 2 ft. high.

Epipactis.—This is a small family of which two species may be selected as worth growing. They like a strong loamy soil, but the latter prefers the moister situation.

E. gigantea.—This bears yellowish-brown and red flowers in May and June, and grows about 1 ft. high.

E. palustris.—This is a free growing sort with brown and white-flowers in June, on stems about 1 ft. high.

Orchis.—This is a very large family and contains many beautiful kinds. They all grow freely in moist loamy soil. The following are the best :—

O. foliosa.—This, the MADEIRA ORCHIS, bears long spikes of rosy-purple flowers in May, and grows 1½ ft. high.

O. latifolia.—This, the MARSH ORCHIS, is a strong-growing native species with spikes of pale purple spotted flowers in early summer. Forms of this often grow over 2 ft. high.

O. maculata.—This, the SPOTTED ORCHIS, is another native species with spotted leaves and spikes of flowers varying in colour from bright purple to white. It flowers in May, and grows 1 ft. high.

Other Hardy Orchids which may be easily grown include the BUTTERFLY ORCHIS (*Habenaria bifolia*), with yellow and white flowers; the BEE ORCHIS (*Orchis apifera*), with velvety-brown flowers; the TWAYBLADE (*Listera ovata*), with green flowers; and the LIZARD ORCHIS (*Orchis hircina*), with greenish-yellow long-tailed ones. The one known as LADIES' TRESSES (*Spiranthes autumnalis*), with spikes of white flowers, should also be grown if space admits.—W. I.

HARDY PERENNIALS.—See *PERENNIALS: GENERAL CULTURE OF.*

HARDY PLANTS FOR EDGING.—See *EDGING: HARDY PLANTS FOR.*

HARE-BELL (*Campanula rotundifolia*).—See *CAMPANULA.*

HARE'S EAR.—A name applied to the genus BUPLEURUM. See *SHRUBS*.

HARE'S FOOT FERN (*Davallia canariensis*).—See *FERNS AND FERN GARDENING*.

HARE'S FOOT TREFOIL (*Trifolium arvense*).—See *TRIFOLIUM*.

HARE'S LETTUCE (*Sonchus oleraceus*).—See *SONCHUS*.

HARE'S TAIL GRASS (*Lagurus ovatus*). See *ORNAMENTAL GRASSES*.

HARICOT BEAN.—See *PHASEOLUS*.

HARMFUL FUNGI.—See *FUNGI: EDIBLE AND HARMFUL*.

HARPALIUM.—Now included in the genus HELIANTHUS.

HART'S ELDER (*Sambucus racemosa*).—See *TREES*.

HARTSHORN PLANTAIN (*Plantago Coronopus*).—See *PLANTAGO*.

HARTSTONGUE FERN (*Scolopendrium vulgare*).—See *FERNS AND FERN GARDENING*.

HARVESTING VEGETABLES.—See *VEGETABLES: HARVESTING AND STORING*.

HARVESTING VIOLETS.—See *VIOLETS*.

HASSOCK GRASS (*Carex paniculata*). See *CAREX*.

HAUTBOIS (*Fragaria elatior*).—See *FRAGARIA*.

HAWKBIT (*Leontodon*. Nat. Ord. Compositæ).—A very large number of Hawkbits have been described, and nearly a dozen are grown at Kew. All are weedy, hardy herbaceous perennials of no garden value, and thus we do not propose to devote space to describing them here.

HAWKWEED (*Hieracium*. Nat. Ord. Compositæ).—The Hawkweeds are among the coarser growing hardy perennials, and while they are as a rule excluded from the choicer borders, they are none the less useful in the rougher parts of the rock garden, in the shrub border, and in the wild garden. The dwarfer sorts are best for the herbaceous border or rock border. They succeed in sun or light shade, in common garden soil, and are propagated in the usual way by seeds sown in the summer, or by division of the plants in the autumn or spring. They may be successfully planted any time from October to March.

What to Grow.—A very large number of species have been described and are frequently included in Horticultural Dictionaries. We confine our attention, however, to the few described below, which we cordially recommend:—

Hieracium alpinum.—This is a pretty yellow-flowered subject for edging or rock garden, blooming in July. It grows 6 ins. high.

H. anglicum is very similar to *H. alpinum*.

H. aurantiacum.—This is an attractive species bearing bright orange flowers in June and July. Its height is about 2 ft.

H. Bommuelleri.—This is a useful sort bearing vivid yellow flowers from June to August, and growing 1 ft. high.

H. Pilosella (MOUSE-EAR HAWKWEED).—This is a weedy creeping yellow June-blooming sort of no value for the borders. [It may, however, be grown in the wild garden.—EDITOR.] Its height is 6 ins.

H. villosum.—This is the best sort of all for herbaceous borders. It bears yellow flowers in July, and averages 1–2 ft. in height.

HAWTHORN (*Crataegus Oxyacantha*). See *TREES*.

HAY-SCENTED BUCKLER FERN (*Nephrodium æmulum*).—See *FERNS AND FERN GARDENING*.

HAZEL.—A name applied to the genus CORYLUS. See *TREES*. See also COBNUT, FILBERT, and HAZEL in *NUT CULTURE*.

HEADED CROPS.—See *KINDS OF CROPS*.

HEART CLOVER (*Medicago maculata*). See *MEDICAGO*.

HEART AND DART MOTH.—See under Surface Larvæ in *Insect Pests.*

HEART-LEAVED EUCRYPHIA (*Eucryphia cordifolia*).—See *Climbing and Trailing Plants.*

HEARTSEASE.—See under Violet in *Medicinal Herbs.*

HEATED PIT.—See *Garden Frames*

HEATH.—See *Heaths*, and under Calluna and Erica in *Shrubs.*

HEATH GRASS (*Triodia decumbens*). See *Triodia.*

HEATHER.—See Erica in *Heaths*, also Calluna in *Shrubs.*

HEATHS.

There are a considerable number of varieties of the heather cultivated in gardens, and when planted in suitable spots these provide in their season a source of infinite delight. Heathers find an ideal place in the foreground of collections of larger growing plants such as Azaleas, Gaultherias, and Rhododendrons. The vigorous growing kinds furnish an added charm to woodland scenery, and all of them, especially the smaller ones, make excellent rockwork plants. Heather gardens are becoming more and more popular every season, as the plants furnish their flowers all the year round. At least twenty different kinds may be grown in ordinary garden soil without any peat whatever; and the secret of preserving the life of heathers grown in gardens is to prune immediately after the flowering period, which is a lengthy one.

Propagation.—This may be carried out by seeds, cuttings, or by layering. The latter is the surest way of quick production. A good mixture of peat and loamy soil should be placed liberally around the plant, and the centre filled up, at the same time bending and spreading the growth out from the centre. Some good-sized stones placed on the growths will hold them down. Layers will take from nine to twelve months to root, and in the month of September the growth can be cut off from the parent plant with safety.

Uses of Heaths.—Many and varied are the uses to which heaths are put, though these are in many cases confined to the Highlands: the hardy Scotch, for instance, thatch their cottages with heather, and very often they make their beds of the same material, avowing that they are much more comfortable and healthy than the feather beds of the effeminate lowlanders. A considerable trade is carried on each year in making brooms and scrubbing-brushes from heather. From time immemorial dyes have been extracted from some species; these, mostly green and yellow, being used in the manufacture of tartan cloth. Herbalists find many uses for decoctions, etc., of heather against tumours, gout, dysentery, and scurvy, while mountain cattle are frequently fed on the tender tops of the heather, and this diet is said to yield very sweet meat.

Varieties of Heaths.—The heathers which flourish so luxuriantly on the mountains of England and Scotland are *Calluna vulgaris* and *Erica Tetralix*, the Cross-leaved Heath. Those who have visited the Lake District in August and September in the valley of Easdale, Grasmere, of Wordsworth fame, or the slopes of Scawfell and Skiddaw in Cumberland, will have cause to remember the glorious picture of heather when the sun is setting, casting its lights and shadows at eventide.

We give below a selection of the best varieties for garden purposes. A very large number have been described, and to attempt to give a complete list here would be quite beyond the scope of the present work. Most of the varieties are highly useful in the rock garden as well as in the heath garden or heath border.

Calluna vulgaris (Syn. *Erica vulgaris*).—This is the Common Ling, and is the only species in the genus. It is a low-growing shrubby plant of which there are numerous varieties. The flowers of this type are purple. All varieties succeed in ordinary sandy loam or peat, and flower from August to October.

The following are distinct varieties:—

Alba.—The Common White Heather. Height, 9–12 ins.

Alporti.—The best crimson form. Height, 15 ins.

Argentea.—A sort with silver-tipped foliage. Height, 12 ins.

Aurea.—An attractive variety with golden-tinted foliage. Height, 12 ins.

Flore pleno.—The Double-flowered Heather. Height, 12 ins.

Hammondi.—A pure white sort. Height, 18 ins.

Searlii.—A pure white sort. Height, 9 ins.

Daboëcia polifolia (Syn. *Menziesia polifolia*).—This is the St Dabeoc's Heath and produces purple bells of flowers in spikes. It succeeds in a half-shady site and moist peaty soil, flowering from July to October. Its height is 12–18 ins. *D. p. alba* has white flowers, while *D. p. atropurpurea* produces purple-crimson bells.

Erica (Heather. Nat. Ord. Ericaceæ).—This is a large family of dwarf shrubby plants which all flourish in sandy loam or peaty soil, except *Erica carnea* which likes a calcareous soil. The following species are nearly all hardy:—

E. arborea (Tree Heath).—Hardy only in the south. Flowers white, fragrant. Flowering Period, March to May. Height, 6 ft. *E. a. alpina* is a hardy form of this species.

E. australis.—Flowers rosy-purple, fragrant. Flowering Period, March to May. Height, 2–3 ft.

E. carnea (Alpine Forest Heath).—Flowers pink. Site partly shaded. Soil, limestone. Flowering Period, January to April. Height, 4–6 ins.

E. ciliaris (Dorset Heath).—Flowers large pale purple bells. Flowering Period, June to October. Height, 1 ft.

E. ciliaris mawiana is larger in all its parts and deeper in colour. The variety *alba* has white flowers.

E. cinerea (Scotch Heath).—Flowers purple. Flowering Period, July to October. Height, 9 ins. The variety *alba* has white flowers, and *coccinea* has bright crimson ones.

E. lusitanica (Portuguese Heath).—Flowers white in long sprays. Flowering Period, December to April. Height, 3 ft.

E. mediterranea.—Flowers pale pink. Flowering Period, March to May. Height, 2–5 ft. *E. m. alba* has white flowers, while *E. m. hybrida* is a dwarfer form, with deep pink flowers blooming in January.

E. stricta (Corsican Heath).—Flowers pale pink. Flowering Period, June to July. Height, 2–3 ft.

E. Tetralix (Marsh Heather [1]).—Flowers rosy-purple. Site open. Soil moist peaty. Flowering Period, August to October. Height, 1 ft. *E. Tetralix Mackaii* is a variety with flowers rose coloured on the sunny side and almost white on the other.

E. vagans (Cornish Heath).—Flowers purple. Flowering Period, July to October. Height, 18 ins. *E. vagans alba* has white flowers.

E. Veitchii.—Flowers white.

---

[1] The Cross-leaved Heath of Kew.—Editor.

Flowering Period, February to April. Height, 3 ft.

E. Watsoni. — Flowers bright purplish-pink. Flowering Period, July to September Height, 1 ft.

T. R. H. & W. I.

HEATING.—See *GREENHOUSE BUILDING AND HEATING.*

HEAVILY SCENTED FLOWERS.—See *FLOWERS UNSUITABLE FOR CUTTING.*

HEAVY-LEAVED PINE (*Pinus ponderosa*).—See *TREES.*

HEAVY SOILS: ARTIFICIALS FOR.—See *ARTIFICIAL FERTILISERS.*

HEAVY SOILS: VEGETABLES FOR.—See *VEGETABLES: GENERAL CONSIDERATIONS.*

HEBERSTRETIA. — See *ANNUALS, HALF-HARDY: LIST OF.*

HEDERA.—For the best species see *CLIMBING AND TRAILING PLANTS.*

HEDGE HYSSOP.—See *GRATIOLA.*

HEDGE MUSTARD. — See *SISYMBRIUM.*

HEDGE STRAW (*Galium Mollugo*).—See *GALIUM.*

HEDGEHOG.

Gardeners often regard this as an enemy and destroy it, or banish it from the garden. This is a great mistake. It feeds chiefly on harmful insects, and while it may also eat a few earthworms, it should certainly be regarded as a friend and not an enemy.

HEDGEHOG CACTUS (*Echinocactus Simpsonii*).—See *CACTI.*

HEDGEHOG FUNGUS.—See URCHIN-OF-THE-WOODS under EDIBLE FUNGI in *FUNGI: EDIBLE AND HARMFUL.*

HEDGEHOG GOURD. — See *ORNAMENTAL GOURDS.*

HEDGEHOG GRASS (*Cenchrus tribuloides*).—See *CENCHRUS.*

HEDGEHOG HOLLY (*Ilex Aquifolium ferox*).—See *HOLLY.*

HEDGEHOG JUNIPER (*Juniperus communis hemisphaerica*). — See *TREES.*

HEDGES.—See *GARDEN HEDGES.*

HEDGES: ROSES FOR.—See ROSES FOR HEDGES in *ROSES FOR ALL PURPOSES.*

HEDYPNOIS.—Now included in the genus LEONTODON.

HEDYSARUM (Nat. Ord. Leguminosæ).—This genus is not largely grown, but it includes some pretty plants for the borders and rock garden, so it should not be wholly neglected.

Biennial Border Species.—These require the usual treatment for hardy biennials and may be successfully raised from seed sown in the early summer, the young stock either being wintered in a frame or in a sheltered bed outside. Only two species are generally grown.

Hedysarum coronarium (FRENCH HONEYSUCKLE).—This bears attractive scarlet flowers from June to August, and grows about 1½ yds. high.

H. pallidum.—This is a rose and pale red sort blooming about June, and growing 1½ ft. high.

Perennial Border Species.—These succeed if given the usual treatment for perennials. They should be planted in March in open sunny borders in ordinary loam of moderate quality, and may be propagated by division of the roots in February and March. There are a large number of sorts, of which we reconmend the following:—

Hedysarum capitatum.—This is a rose-coloured sort blooming in June and July, and growing about 2 ft. high.

H. microcalyx.—This is an attractive species bearing bright purple flowers in June, and growing about 1½ ft. or more high.

H. polymorphum. — This useful rose-flowered June blooming sort grows about 12 ins. high.

H. sibiricum.—In this we have another purple sort bearing pretty flowers in June, and growing about 1½ ft. high.

Rock Garden Species.—Only three need be named here; these, however, are pretty covering plants, and well worth growing:—

Hedysarum boreale.—This is a pretty sort. Flowers purple. Site sunny and among rocks. Soil light rich loam. Flowering Period, June to July. Height, 6 ins.

H. neglectum.—This is useful for the rougher parts of the rock garden. Flowers purplish. Site sunny. Soil ordinary loam. Flowering Period, June to July. Height, 1½–2 ft.

H. obscurum (Syn. *H. alpinum*).—This is a pretty little plant with erect stems. Flowers purple. Site sunny. Soil light rich loam. Flowering Period, July to August. Height, 6 ins.

See also *SHRUBS*.

HELENA.—Now included in the genus *NARCISSUS*.

HELENIUM (SNEEZEWORT, etc. Nat. Ord. Compositæ).—This is a genus of extremely useful hardy perennial plants for herbaceous borders and shrubbery margins. They are highly valuable for cutting, very showy in the border, and easy to cultivate.

Culture.—The plants can be grown without difficulty in a good ordinary garden soil in a sunny site, and may be planted any time between November and March. When division is necessary this may be done at the same period. The taller varieties need early staking, but little feeding and watering is necessary. They may easily be raised from seed sown in March or June. Seed may also be saved with little difficulty from the earlier flowering sorts.

What to Grow.—There are a large number of excellent sorts to choose from. We recommend the following:—

H. autumnale.—This is one of the most popular species which flowers all the late summer and autumn. There are many varieties of it, such as *compactum bicolor* (yellow and crimson); *cupreum* (crimson and gold); *grandiflorum* (yellow with darker coloured centre); *magnificum* (rich golden-yellow); *praecose* (clear yellow); *striatum* (bright orange-yellow); and *superbum* (golden-yellow). The height averages about 3–4½ ft. See also *H. pumilum*.

H. Bigolovii.—A late flowering species with yellow flowers. Height about 4 ft.

H. Bolanderi.—A fine sort which should be very largely grown. The flowers are yellow and produced from July onwards. Height about 1½–2 ft.

H. grandiflorum (or *H. grandicephalum* of the nurseryman).—Some authorities refer this and *H. pumilum* to *H. autumnale* and to *Inula grandiflora*. It has large yellow flowers, blooms from July to August, and averages about 4–5½ ft. in height.

H. Hoopesii.—A useful kind with bright yellow flowers, sometimes orange-yellow. It blooms from June to September, and is 2½ ft. high.

H. nudiflorum.—A synonym of *H. autumnale*, which see.

H. pumilum.—This popular so-called species of which there are many varieties is now considered synonymous with *H. autumnale*. Thus the sort *magnificum* (rich golden-yellow), so freely described in trade lists, should be *H. autumnale magnificum*, and the varieties known as *Riverton Beauty* and *Riverton Gem* (yellow and red) should be classed as forms of *H. autumnale*, and not as varieties of *H. pumilum*. The flowering period extends from July to November, and the height ranges from 2½–5 ft.

HELIANTHEMUM (SUN ROSE. Nat. Ord. Cistaceæ).—A genus of sub-shrubby plants suitable for sunny banks and old walls in the rock garden. They are propagated by cuttings in autumn, or by seeds sown in spring. Four species are desirable :—

Helianthemum canum.—A prostrate species. Leaves silvery. Flowers bright yellow. Site sunny. Soil sandy loam. Flowering Period, all the summer. Height, 2 ins.

H. italicum var. *oelandicum.*—Also prostrate. Flowers deep yellow. Site sunny. Soil sandy loam. Flowering Period, June to July. Height, 3 ins.

H. Tuberaria.—This has tufted growth. Leaves large. Flowers yellow, in umbels. Site sunny. Soil sandy loam, well drained. Flowering Period, June to July. Height, 6 ins.

H. vulgare.—This is more or less prostrate. Flowers many colours, orange, pink, red, rose, and yellow. Site sunny, in rock border or wall garden. Soil sandy loam, with lime in it. Flowering Period, June to August. Height, 4–12 ins., according to variety.—W. I.

See also *SHRUBS*.

HELIANTHUS.—See *SUNFLOWER*.

HELICHRYSUM (EVERLASTING FLOWER. Nat. Ord. Compositæ).—Apart from the well-known *H. bracteatum*, which is dealt with in our article on *EVERLASTING FLOWERS*, there are some few species of trailing or tufted habit suitable for the rock garden. They may be propagated by division in the spring or by means of cuttings in July. We recommend the two following :—

H. bellidioides.—This is a creeping plant. Flowers white in heads. Site open and sunny. Soil well-drained gritty loam. Flowering Period, July to September. Height, 4 ins.

H. frigidum.[1]—This is a small tufted plant. Flowers white in heads. Site open and sunny. Soil gritty loam in a rocky crevice. Flowering Period, July to September. Height, 3 ins.

See also *EVERLASTING FLOWERS*.

HELICIDÆ.—See SLUGS AND SNAILS in *INSECT PESTS*.

HELIOPHILA.—See *CAPE STOCK*.

HELIOPSIS (ORANGE SUNFLOWER. Nat. Ord. Compositæ).—This attractive little genus of hardy herbaceous perennials is somewhat neglected, but it is distinctly useful for the back of the perennial border, shrub border, or the wild garden. The plants succeed in ordinary good rich garden soil in a sunny site, and are easily propagated by seed in the usual way or by division of the rootstock in the autumn or spring, at which times they may be successfully planted. Only two species are grown at Kew ; these are briefly described below :—

Heliopsis laevis. — This bears yellow or orange flowers in August and September, and averages about 2 yds. in height.

H. scabra.—This bears yellow flowers from August onwards, and both single and double forms are available. Its variety *pitcheriana* bears bright orange flowers and is the most attractive. The height averages 2–4½ ft.

HELIOSPERMA.—Now included in the genus *SILENE*.

HELIOTROPE.—The generic name is now *HELIOTROPIUM*.

HELIOTROPIUM[2] (CHERRY PIE. Nat. Ord. Boraginaceæ).—This is a free flowering, soft-wooded evergreen shrub, with slightly scented flowers, and is useful for greenhouse culture or summer bedding. It is propagated by cuttings in spring and autumn in slight bottom heat, and should be grown in light rich soil. Temperature required in winter, 40° F.

---

[1] This is not quite hardy, and must be covered with glass to keep it through the winter.—EDITOR.

[2] The botanical name used to be *HELIOTROPE*.—EDITOR.

Greenhouse Varieties.—*Heliotropium Madame Braunt.* — Mauve. Flowers from May to September. Height, 1–3 ft.

H. Paul Pfitzer.—Light flower, blooming from May to September. Height, 1–3 ft.

H. President Garfield. — Mauve. Flowers from May to September. Height, 1–3 ft.

H. Priapo.—Blue, with white eye. Flowers from May to September. Height, 1–3 ft.

H. Roi des Noirs.—Deep maroon-purple. Flowers from May to September. Height, 1–3 ft.

H. White Lady.—Nearly white. Flowers from May to September. Height, 1–3 ft.

UP-TO-DATE SELECTIONS.

Heliotropium New Giant. — Of extra large size. *H. Sweet-Scented Bedding.*—Lilac.

HELIPTERUM. — See *ANNUALS, HALF-HARDY: LIST OF.*

HELIX.—See under SLUGS AND SNAILS in *INSECT PESTS.*

HELLEBORE SPRAY.—See *INSECT PESTS: GENERAL METHODS OF DESTRUCTION.*

HELLEBORUS (BEARSFOOT. Nat. Ord. Ranunculaceæ).—Quite delightful hardy herbaceous perennials are all the species of this genus, except perhaps *H. foetidus.* As a rule they are exceedingly easy to grow, thriving well in light moist soil in a shady margin to the shrub border, or an easterly aspect in the perennial border. They are easily propagated by seeds sown in the usual way in the spring or summer, and are not difficult to increase by division of the roots in the spring (March), which is also the most suitable time to plant. Some of them, notably the CHRISTMAS ROSE (see *Helleborus niger* below), are useful for cutting, and all are showy plants for the border. As the plants are poisonous, children should not be allowed to touch them. The following is a representative selection :—

Helleborus antiquorum.—This is a white March blooming sort, growing 1½ ft. high.

H. caucasicus.—This bears greenish flowers in the spring, and averages 1½ ft. in height.

H. colchicus.—This useful sort bears full-coloured purple flowers in February, and grows 1½ ft. high.

H. foetidus (STINKING HELLEBORE) —This is the least desirable of all, with its strong, unpleasant smelling greenish flowers in March. It grows 18 ins. high.

H. niger (BLACK HELLEBORE and CHRISTMAS ROSE).—This is probably the most largely grown of all, and is a great favourite with its white flowers in February and March on plants 1 ft. high. Various varieties of it are offered by the trade, pinks, purples, and whites, or at times prettily spotted, and of similar height, the best of which are: *altifolius* (often in bloom earlier than February), *angustifolius*, *praecox*, and *Riverstoni.*

H. orientalis (Syns. *H. officinalis* and *H. ponticus*).—This sort and its variety *roseus* are popularly known as LENTEN ROSES. Their flowers are exceptionally lovely, and the named varieties, of which there are not a few, include a wide colour range from pale purple, dark purple, rosy-purple, and crimson-purple, through shades of pink to a crimson spotted white. All flower freely from February onwards, and average 1–2 ft. in height.

H. viridis.—Of the numerous greenish varieties of this offered for sale and grown at Kew, only one is in our opinion really worth growing. This, *H. v. purpurascens*, bears rich purple flowers with but little green in them from March onwards, and averages 1½ ft. in height. Another plant named *H. viridis* is now referred to *H. caucasicus*, which see.

HELONIAS.—See *STUD FLOWER.*

HELOSCIADIUM.—Now included in the genus *APIUM.*

HELVEL. — See EDIBLE FUNGI in *FUNGI: EDIBLE AND HARMFUL.*

HEMEROCALLIS (DAY LILY. Nat. Ord. Liliaceæ).—This is an attractive genus of beautiful hardy herbaceous perennial plants worthy of more extensive cultivation. They are very useful for herbaceous, mixed, or strictly perennial borders, and may be used in the water garden. (See remarks on DAY LILY in our article on *WATER GARDEN: PLANTS FOR THE.*)

Culture.—This is a very simple matter indeed, if ordinary light loam on the moist side is provided. Success may be attained with the usual (somewhat haphazard) culture bestowed on other hardy perennials, though the taller sorts need, it is true, careful staking. Propagation is best effected by root division in March, which month is also the best planting period.

What to Grow.—Some of the species previously classed in this genus are now included in other genera, such as Funkia and Lilium. Only a few of the best species and hybrids can be included here on account of restricted space:—

Hemerocallis aurantiaca.—This and its variety *major* are deservedly two of the most popular sorts. They bear brilliant orange or deep orange-yellow flowers from June to September, and average 1½–3 ft. in height.

H. disticha.—Syn. *H. fulva*, which see.

H. Dumortierii (Syn. *H. rutilans*). —This and its variety *Sieboldii* bear orange-yellow and orange-pink flowers respectively from July to August, and average 1½ ft. in height.

H. flava.—This bears yellow flowers in June, and grows 2 ft. in height.

H. fulva (Syn. *H. disticha*).—This and its varieties *Kwanso* and *variegata* bear coppery coloured flowers from July to August, and grow about 1 yd. in height.

H. graminea.—Syn. *H. minor*, which see.

H. hybrida.—Under this head we include a few of the best hybrid forms. *Apricot* is typical apricot-colour; *Aureole* is dark orange; *Dr Regel* is deep apricot; *Gold Dust* is a lovely rich gold; *Orangeman* is, as its name implies, a first-class orange; *Queen of May* is an early sort with yellow flowers; *Sir Michael Foster* is deep yellow; and *Sovereign* is bright orange-yellow. These bloom profusely from June onwards, averaging 2–3 ft. in height.

H. luteola.—This is a most useful species bearing golden-yellow to orange-yellow blooms from June to August, and averaging 3–4 ft. in height.

H. Middendorffii.—This and its variety *major* bear yellow or orange-yellow blooms in July and August, while their height averages 2–4 ft.

H. minor (Syn. *H. graminea* and *H. pumila*).—This is the dwarfest of all and bears golden-yellow flowers from August to October, only growing 12 ins. high.

H. rutilans.—Syn. *H. Dumortierii*, which see.

H. Thunbergii.—This bears dark yellow blooms from June to August, and grows about 2 ft. high.

UP-TO-DATE SELECTIONS.

Hemerocallis fulva cypriana.—Orange-red, apricot, and brown. *H. Tangerine.*—Orange-yellow.

HEMIDICTYUM.—Now included in the genus ASPLENIUM, for which see *FERNS AND FERN GARDENING.*

HEMILEPIS.—Now included in the genus LEONTODON.

HEMLOCK.—See *CONIUM* and *MEDICINAL HERBS.*

HEMLOCK FIR.—A name applied to the genus TSUGA. See *TREES.*

HEMLOCK SPRUCE (*Tsuga canadensis*).—See *TREES.*

HEMP AGRIMONY. — See *EUPATORIUM.*

HEMP NETTLE.—See *GALEOPSIS.*

HEN AND CHICKENS (*Sempervivum globiferum*).—See *SEMPERVIVUM.*

HENBANE.—See *HYOSCYAMUS* and *MEDICINAL HERBS.*

HENINGIA.—Now included in the genus *EREMURUS.*

HEPATICA.—Now included in the genus *ANEMONE,* which see.

HEPIALUS. — See GARDEN SWIFT MOTH in *INSECT PESTS.*

HERACLEUM (COW PARSNIP. Nat. Ord. Umbelliferæ).—Most of the Cow Parsnips are a great deal too coarse in habit to be worthy of a place in the flower borders. They are, however, distinctly useful for shrub borders, the water garden, or in the wild garden, where they may be grown in almost every kind of soil with little care. The perennials may be propagated without difficulty by root division, and any species by seeds at the usual times, and may be successfully planted in open weather throughout the winter.

Biennial Species.—The following may be included if space permit, all of which produce white flowers in May and June: *H. asperum* (3–4 ft.); *H. pyrenaicum* (3 ft.); *H. Sphondylium,* the coarse growing HOGWEED (4–5 ft.); and *H. villosum* (4–12 ft.).

Perennial Species.—These are preferable to the above biennials. All those named below bear white flowers from June to September: *H. lanatum* (4 ft.); *H. Leichtlinii* (5–6 ft.); *H. nepalense* (4–6 ft.); *H. Panaces,* popularly known as HERCULES ALL-HEAL (4–6 ft.); *H. persicum* (10–14 ft.); and *H. Wallichii* (4–6 ft.).

HERB CHRISTOPHER.—See *ACTAEA.*

HERB FRANKINCENSE (*Laserpitium latifolium*).—See *LASERPITIUM.*

HERB GARDENING.

Herb Growing and Herb Gardening are two different matters—that must be realised to start with. Herbs can *grow* anyhow, best of all in their natural condition, but Herb Gardening is a trained science and requires, moreover, a knowing eye to trade, to bear on the process.

The first point is to decide on what you are going to expend your gardening care and knowledge, and this depends on what you mean to cater for: whether you decide to supply the druggists, or to grow your herbs to meet the needs of some branch of industry or trade. You will find your choice must be greatly governed by the soil and situation of your land: what you can grow successfully depends on whether your soil is either wet, medium or moist, or dry and well drained; and whether the situation is sunny and open, or shaded. If you raise for culinary uses, most of the herbs utilised for this thrive in light, dry, limy, or chalky soils and in open positions, the fullest and most delicate flavours coming through sunlight. Again, the greatest percentage of oils and fatty substances produced in plants required in industrial trades, and also the majority of plants useful both to the herbalist and in the veterinary sphere, are obtained from herbs grown on light soils. Druggists' plants, on the other hand, such as Aconite, Valerian, etc., lean more to damp soil, favouring moisture. It is no good trying to cultivate for profit plants to which your soil is unsuited.

As regards general methods of cultivation, in light soil herbs need little or no "cultivation," they "grow splendidly": given open space and unlimited sunlight and the roughest weeds being kept down, they will luxuriate, being real children of Nature. Some of the druggists' plants like, too, to live their days in peace—in quiet woods and watery meadows, following their own sweet will, developing into fat, luscious creatures, needing no care, only the freedom to live and spread, the bees and other insects doing their natural duties of fertilising without human interference, thus effecting the setting of seeds and propagation. Such are, for instance, the Comfrey, the Hemlock, Meadow Saffron, Sweet Flag, etc.

In growing for trade, you have to aim at attaining in the plants the growth and state in which they will yield their highest percentage of medicinal values, technically called "alkaloids." There are many points to be paid attention to before you have learnt your lesson in that branch of the subject; for example, Foxgloves yield their best medicine from wild plants, not from those brought into the garden and cultivated, or fussed with manurial doses of medicine of various sorts: if you bring them farmyard droppings or potash got from burnt refuse, they will not thank you for it—it will only make them sickly. The best and most valuable medicinal juices are often to be got from the wild children of the hedges and ditches, growing anyhow and anywhere.

Of course, some valuable herbs like the Belladonna, for instance, will, however, need special food and special care and attention to produce their best, and their cultivation must be carefully studied and carried out, always though with a view to giving them as far as possible their natural conditions as regards soil and situation.

The propagation of your stock is a point of very practical importance. You must know how to increase it from year to year with the least expense, and must learn in which cases this is to be done by cuttings, when by division of roots, and when by seeds only. Some seeds, you should remember, require to be sown the minute they are ripe, others in the following spring only. Cuttings are best taken in spring-time: put down a line, dig a sharp little trench and then lay in your cutting (which must not have borne flower but be slightly ripened, and not too juicy or succulent); if the soil be heavy, put a little sand or a little mortar rubbish in the trench first, but not if the soil be light. Earth up to the leaves of the cuttings and tread firmly in the ground, to let the cuttings "bite" it a little, and make them "callus" quicker. Give a little shade and water for a few days (an inverted flower-pot will often meet the latter case) until the leaves begin to freshen—a sign that rooting has commenced and the cuttings started to grow, but do not attempt to hurry the cuttings.

Now to the last stage—harvesting of our herb crops, whether for cookery or medicine. You must cut your herb when the sap is flowing strongest and fastest, just as it is about to open its blue or pink eyes in bloom. If it is the root alone you are going to harvest, you must, however, never let the plant bloom and run to seed—all its essence and strength must be driven into its root production by keeping its bloom cropped off, even before it forms a flowering head. You may perhaps be wanting to grow for seed: remember then this point, your most fertile seeds come from your earliest and fattest blooms, and you must gather them just at the auspicious moment, in brightest sun, when newly, fully ripe, and when once gathered, you must never allow seeds to get damp, even for a moment.

But your work is not yet over. After harvesting, there still remains the important process of drying and preparation for market, before the produce can obtain a saleable value, but space forbids me to enter fully into the details, which vary according as the whole plant, or only the leaves, the flowers, seeds, roots, or bark is the part that is to be used in medicine or trade.

Even in such a brief account, enough has been said, however, to indicate that "Herb Growing" and "Herb Gardening," besides being a pleasant and attractive occupation, is one in which success, as in everything else worth doing, depends entirely on proper understanding of herbs themselves, and for notes on individual herbs the reader should refer to the separate articles upon them.—M. G.

HERB GROWING.—For hints on this see *HERB GARDENING*, *MEDICINAL HERBS*, and *POTHERBS*.

HERB LILY.—See *ALSTROEMERIA*.

HERB PARIS.—See *PARIS*.

HERBACEOUS BORDERS: MAKING NEW.—The making of new herbaceous borders is probably one of the very pleasant tasks the gardener has to do. He sees a dull worn-out shrubbery which never has pleased and never will please his master and mistress, and makes the suggestion that it should be transformed into an herbaceous border full of glorious colour. The suggestion is agreed with, and the gardener sallies forth to begin.

He feels as he looks over the expanse of ground that he has taken on what may well be a Herculean task. How shall he begin, and how shall he finish, these are two questions he asks himself.

Clearing the Land.—It is no good doing the border in bits. The present writer has seen such a thing attempted, and while the start may be brilliant, before the border is half-done the gardener will find himself in a muddle and wish himself out of it. By far the best way is to clear the whole of the ground first, scrapping all the shrubs which are no use, and re-planting elsewhere those which are of some slight value. The surface of the ground being clear, it should be forked over to remove stones and roots.

Preparation of the Soil.—The next thing to do is to dig thoroughly, or better still to trench the whole of the plot. The writer considers trenching of enormous importance in the first instance, and wherever possible it should be carried out. During the trenching, which should be done if possible in September for autumn planting, or December and January for spring planting, plenty of manure should be mixed in with the bottom two spits of soil, and a good layer put at the bottom of the top spit. Basic slag or bonemeal can be freely mixed with the top spit of soil, also burnt ashes from the garden bonfire, and these three materials will mightily improve it.

In trenching the soil for the border,

care should be taken not to bring any of the sour subsoil up to the top. Lime and basic slag should be mixed freely with the subsoil, though they should not come into direct contact with the manure. Cow and pig dung are best for soils of a sandy nature, and horse manure and rotted vegetable refuse (excluding such a binding material as lawn mowings) for a soil that is heavy.

The bed so trenched should have at least a month to settle, and our next consideration is :—

Planting.—Much has been written in the Press on the advantages and disadvantages of autumn planting. The present writer, working as he does in a very cold exposed district where icy winds and snow blow straight from the moors, is of the opinion that spring planting is preferable in every way to early autumn planting, since the flowers have a far smaller check when planted then, than when planted just at the beginning of what may be a very severe winter. But in warmer southern districts where plants bloom freely out of doors in late December and early January, he would strongly urge on gardeners the wisdom of early winter or autumn planting, since there is absolutely no doubt that much finer plants, earlier and better flowers, as well as much more bloom can be produced that way when the climatic conditions are such that the plants do not feel the cold. For early blooming plants such as Anchusas, Doronicums, Lupines, Paeonies, etc., autumn planting is specially desirable ; spring planting producing later blooms of much smaller and poorer quality.

The planting itself is fairly easy in the case of ordinary clumps, but difficult in the case of such plants as perennial Anchusas, Lupines, Sunflowers, etc., possessed of long tap or forked roots. In the case of ordinary clumps, holes into which they will just comfortably fit are taken out with the spade. The holes must not be made deeper than the soil level on the clumps, for if the clumps are buried deeper than before, some of the crowns may rot off. In the case of tap-rooted plants very deep holes must be dug, the roots spread out so that they are not in the least doubled or twisted, and the soil filled in very carefully.

In both cases make the plants very firm. Firm planting is, the writer considers, one of the chief secrets of success. In any case the plants will be loosened by the frost, so the firmer they can be made when planting, the better for them. No plants can be expected to take root in new soil unless it is made reasonably firm round them—a fact wholly overlooked by very many gardeners. After planting, a stick should be put in to mark the places in case the visible portion of the crowns should rot off. The ground should then be lightly raked over to give it a neat finished appearance.

Arrangement of Plants. — More than usual care should be taken in the arrangement of the plants. Ignorance of the habit and nature of the plants will produce some queer effects the following season—a fact many gardeners do not realise at the time. Careless, haphazard arrangement is not worthy of any one who proudly calls himself a gardener. Before starting to plant, the gardener should have a clear idea in his mind what the effect both in colour and form will be, and he should make certain that such is the best arrangement he can manage, otherwise planting will be waste of precious time.

Much has been written on arrangement of plants. Some people adhere slavishly to having the plants set in strict order of their height. This, the writer considers, is one of the biggest possible mistakes, producing as it does a very dull and often "prim" effect. Artistic visitors will say when they see such a border, that too much care has been bestowed upon it. Such a border would have found favour a hundred years ago; then primness, and stern adherence to general principles, was the rule.

It is now, however, greatly preferable not to consider the question of height so much. The border now in the course of construction is to be as fresh and bright as possible. The wish is that it shall be full of little surprises; some charming plant here where we least expected it, and some more farther on. Great blocks of tall plants near the front are, of course, out of place, but small ridges of the nobler plants coming near to it, and effectively concealing the rest of the border from view, are most desirable. Friends should never be encouraged to stand at one end of the border and look right down it with a view to praising it as a whole: the border should be arranged in such a manner that it is impossible to see the whole of its charms without walking from end to end. To secure this, it is desirable to have a winding path; and the ideal, where the area for the border is a large one, is to have herbaceous borders on both sides of the winding path. The path should be arranged so as to wind gracefully in and out among the flowers; then at every corner a new picture will be seen.

As regards colours many gardeners produce a ghastly effect by putting clashing colours side by side. For instance, they will put purple side by side with light blue, yellow beside scarlet, and red against violet. The effect when the plants are in bloom is not only hideous, but highly irritating to the eyes of all who are not affected with colour blindness, and such borders reflect discredit not only on the gardener who made them, but on his master and mistress to whom they belong. Before planting, the gardener should jot down the respective positions of the various colours, on paper, and ask himself if they will clash. If he cannot tell he should submit them to some artist who can. It is impossible to give full details here.

Several colours can be produced by mixing other colours together. These are what are termed mixed, or compounded colours, as distinct from simple or primary colours. A good rule for avoiding clashing mixed colours is found in a definition culled from a recently published book,[1] to the effect that "when a compounded colour contains more of one colour than another, it tends to clash with the colour which is present in the lowest proportion." This statement has been amply proved in practice, and gardeners would do well to commit it to memory.

The arrangement should be such that there are great splashes of colour. Little bits of colour are not worth much, indeed they hardly show at all, but great splashes of colour, produced by planting plenty of plants of one kind or one colour together, are worth walking miles to see. It is thus that gardeners realise the vast beauty of Nature, and such masses of glorious colour make us feel that it is worth living to be a gardener.

Lastly, the border should be so arranged that it is never without some plant of each separate colour in bloom. Its first glory will doubtless be in the early spring with early Anchusas, Anemones, Doronicums, and Irises. But this display must be immediately followed by that from summer blooming plants, late Anchusas, Delphiniums, Erigerons, Inulas, Lupines, Paeonies, Valerians, and many more. To succeed these must be the late summer-blooming plants, *Chrysanthemum maximum*, late Delphiniums, late Inulas, early Sunflowers, Thalictrums, and so on. And these must finally be succeeded by the autumn-blooming plants, such as Border Chrysanthemums, Michaelmas Daisies, Rudbeckias, perennial Sunflowers, and many more. With a little thought and care an herbaceous border will be a picture of glorious colour from 1st April to 1st November, and such a picture is worth producing.—E.

---

[1] *Jottings of a Gentleman Gardener.*

HERBACEOUS BORDERS: Management of, and General Considerations.—Having made and planted the herbaceous border, the next consideration is its management. A border perfect in every way at the start can soon be completely spoilt if it is not managed properly, or if it is neglected at any period of the season. Neglect is frequent; in some cases owing to pressure of other work it is almost inevitable, but very strenuous efforts should be made to give it attention at the proper times.

Winter Management.—At this time of the year the work on the border will be light. It will consist chiefly of refirming the plants after frost, protecting the less hardy roots, such as aquilegias, pentstemons, etc., with mounds of ashes, or cocoanut fibre, and, lastly, of slaying slugs and other garden pests. This last is of vast importance, and even more so in the late winter and early spring when all the plants are just starting to grow. Some soil fumigant should be lightly forked into the ground in February, and slug traps laid on the surface, also the very choicest plants may be protected by means of zinc rings. In the case of existing borders, the wooden labels of the plants, unless they are very large and durable, will need renewing every season, and the winter is undoubtedly the best time for doing the work. Labels which are not brittle or rotten may be scraped, repainted, and rewritten. Any which are inclined to rot should be scrapped and replaced by new ones, for they are cheap enough.

Spring Management.—The spring will bring a busy time upon the herbaceous gardener. He will see his perennials springing up, and with them up will come a multitude of weeds. Slugs and snails will become very busy too; they eat their Christmas dinners not until the spring, but then they make the most of their time if allowed to do so. No one would mind if they would devour the weeds; gardeners would regard them as friends instead of enemies in that case, but no. They leave the weeds to us, and attack with all their strength some of our very best plants. The writer has found they are specially fond of young pyrethrums and anchusas, so extra care of these plants should be taken.

As soon as the plants have grown enough to see properly where they are, the gardener should most certainly bring out the Dutch hoe and go really thoroughly through the border with it, following this immediately with the rake to remove the weeds. During the second week in April annuals can be sown to fill up gaps caused by loss of plants. Good, bright annuals for this purpose include such as *Calendula grandiflora*, Godetias of the dwarfer sorts, *Phacelia campanularia*, annual Chrysanthemums, dwarf annual Sunflowers, and many more. In the late spring the border should be well hoed again and the choicer subjects mulched with manure or rotted lawn mowings. This will keep the moisture in.

Summer Management.—This is undoubtedly the most important of all the seasons as regards the herbaceous border. Plants will be flowering very freely indeed, and every possible effort to continue their blooming period as long as possible should be made. First of all comes the matter of staking, and it should, as our contributor in his article on *Stakes and Staking* says, be done before the plants really need it. The great thing to avoid in staking is a bunched appearance of the plant, or conversely a forest-like appearance of the border on account of using too many sticks. Stakes of very varied size and strength will be needed, and the stake should err on the side of being over-strong rather than over-flimsy. Staking is, however, fully dealt with in the article just mentioned, and readers are asked to refer to it for further particulars. After staking comes the question of soil cultivation to conserve moisture. The free use of the Dutch hoe will do very much to attain this end, and will keep weeds down as well. But by midsummer the border, if planted with a view to splashes of colour, will be getting thick, and the use of the ordinary hoe will be difficult. When working amongst the plants, staking and tying them,—and this will have to be done at frequent intervals throughout the summer,—a small weeding fork will be found extremely useful for lifting stubborn weeds and freshening up the trodden surface of the soil. At the same time, old mulches, if dried up, can be removed and fresh ones substituted. Watering is of enormous importance if the border is to be kept gay, and should be done regularly three times a week in ordinary dry weather and every evening in exceptionally dry times. It will be a great advantage to the plants if they are lightly syringed over after 6 p.m. at least once a week in dry weather; this will do more to freshen them up than much feeding would do. The writer is not impressed with the great importance of feeding herbaceous plants, for he has seen it so often grossly overdone. Moderate feeding is, of course, highly desirable, but who in these twentieth-century days is content to feed anything moderately? Over-feeding produces rank, sappy growth, and very few flowers; it is an evil to be avoided. *Feeding Plants* is dealt with in a special article of that title, to which the reader is referred.

There are few gardeners who, when they have produced a fine border picture, like cutting the flowers off the plants, and thus spoiling that picture. These gardeners need not be blamed, for it is hard indeed to expect them to agree without demur to such a thing. When flowers are wanted for the house they can, as a rule, however, be obtained in sufficient quantity from the border in the summer-time without spoiling its effect. But in cases where there is an exceptional demand for cut flowers the gardener should provide for this by sowing or planting reserve beds. This is mentioned in the special article on *Reserve Garden*. However, if the flowers are not freely cut from the herbaceous border while they are fresh, they should most certainly be cut off the moment they are dead or withering. Nothing spoils a border so much as a few dead or dying flowers. The gardener will have to keep a constant eye on his plants, in fact, he should never walk down the path between the borders without his knife or his clippers. A snip here and a snap there will greatly improve the look of his border, and timely removal of dead flowers frequently induces the plants to produce more in their effort to perpetuate their genus—a fact frequently overlooked, but of which full advantage should be taken. The writer once took the trouble to compile a list of plants (both annual and perennial), to which the "cut and come again" system may be applied. The list filled more than half a column of one of the gardening papers, and no space for it can be afforded here. Finally, the gardener should most carefully scrutinise his plants throughout the summer for the appearance of any plant diseases, and if they are noticed he should apply at once the remedies given under the diseases in this Dictionary. It is a case of being in time. A timely syringing with liver of sulphur may save the whole lot of plants.

Autumn Management.—This may partly be said to be a continuation of summer management to which we have given rather detailed attention. As gales may be expected in the autumn, the gardener should, early in September, go very carefully over the plants in his border and make firm all stakes, renewing and adding to the ties if necessary. Otherwise a border which might be a lovely sight for a further six or eight weeks may easily be ruined in a single night. Weeds should be pulled up by hand, and the gardener should never pass a weed which is flowering without pulling it up. Dead leaves which blow from trees into the border should also be removed, and the greatest care taken to give the border a neat and orderly appearance. Dead flowers should be taken off regularly at least twice a week, and when the plant growth starts to turn very dry and brown, cut it neatly down to 3 ins. from the ground and clear the rubbish right away. Never leave heaps of rubbish lying about in the border in the early autumn, for nothing looks worse. Finally, right at the end of the season, cut all the plants down with a sharp knife to within 2–3 ins. of the ground, marking their places with a small flower stick, and clearing the rubbish away to give the border a neat, quiet appearance.

GENERAL CONSIDERATIONS.

The Best Site.—In laying out pleasure-grounds or gardens there is very often considerable choice of sites for herbaceous borders. The choice of a suitable site is an important point if the border plants are to do their best, and undoubtedly a border facing due south, despite its heat in summer, is the best. If possible, some arrangement for shelter from cold north and east winds should be made, for these play havoc with the plants. A garden hedge comes in useful here. Where there is a choice of soil, preference should be given to a loam which is on the light side, since many plants do far better in a light loam than in a very heavy clay soil.

Dividing the Plants.—When a border was made as advised in the last article, all the care it will need as regards plant food in the winter is to have some good rotted manure forked into it between the plants each November or February. Great care must be taken when using the fork to refrain from breaking the roots of the plants or bringing them to the surface, and the crowns should not be covered with manure, but with ashes or cocoanut fibre as protection. After three or four years of this treatment the plants will have grown so thick that it will be highly desirable, not to say essential, to lift the whole lot and divide and replant them. The present writer considers that this work is best done in February, or very early March, but in warmer southern localities it is safe and indeed preferable to do it in October or November. The clumps of perennials are lifted with as much soil adhering to their roots as possible, and laid-in in some convenient spot not far away. (The labels should, of course, be firmly tied on to them before lifting.) Then the border can be thoroughly retrenched, plenty of manure, lime, and basic slag being worked into the lower spits, and bones, slag, and bonfire ashes into the top spit, as described in the last article. The clumps are then divided by means of a sharp spade, and the stronger outer parts replanted. In the case of tall, bushy plants the clumps should be 2 ft. apart, but the smaller clumps need only be set 1 ft. asunder or even less.—E.

HERBACEOUS PERENNIALS FOR SEASIDE GARDENS. — See *SEASIDE GARDENS*.

HERBACEOUS PLANTS FOR SHRUBBERIES.—See *SHRUBBERIES: HERBACEOUS PLANTS FOR*.

HERBS.—See *MEDICINAL HERBS* and *POTHERBS*.

HERCULES ALL-HEAL (*Heracleum Panaces*).—See *HERACLEUM*.

HERCULES' CLUB.—A name applied to a decorative Gourd. See *ORNAMENTAL GOURDS*.

HERCULES' CLUB (*Aralia spinosa*).—See *SHRUBS*.

HERMIONE.—Now included in the genus *NARCISSUS*.

HERON'S BILL.—See *ERODIUM*.

HERRING REFUSE.—See *FISH AS MANURE*.

HESPERIS. — See *NIGHT SCENTED STOCK* and *ROCKET*.

HESPEROCORDUM.—Now included in the genus *BRODIAEA*.

HETERODERA.—See KNOT ROOT in *INSECT PESTS*.

HEUCHERA (ALUM ROOT. Nat. Ord. Saxifragaceæ).—This genus is one of which hybridists are very fond, for there are hosts of named sorts offered by the trade. The list of varieties is ever on the increase, and the already lovely flowers are yearly being improved. It is essentially a plant for the herbaceous border, though some of the more startling hybrids, such as *Crimson Spray* (see under *H. hybrida* below), look well when given beds to themselves. All the species and varieties described below are quite hardy, and all are perennials, succeeding in ordinary rich soil in a sunny site. They are easily propagated by seeds sown in the usual way in the spring or summer in light soil, or by division of the roots in the autumn or spring, at which times they may be successfully planted, and lovers of floral effects on the tables in the house should note that most of them, especially the named hybrids, are grand for cutting. Only a selection of the very best can be given here on account of limited space.

H. americana.—This bears purple flowers in May and June, and grows 12 ins. high.

H. brizoides.—Of this there are many varieties. Three of the best are *Flambeau* (pink or rose); *gracillima* (rosy-crimson); and *Profusion* (lovely white). All bloom very freely from June to August, and average 1½–2½ ft. high.

H. glabra.—This is a very pretty pink May flowering sort, growing 12 ins. high.

H. hispida (Syn. *H. Richardsoni*).—This, known as the SATIN LEAF, bears flowers which are veined with purple in May. It is a sort chiefly grown for its foliage, about 1 yd. high.

H. hybrida.—The sort known to, and sold by nurserymen, under this name, bears flowers ranging through flesh tint, and coral red to carmine. It blooms from June to August, and grows 1½–2½ ft. high. There are many other delightful hybrids flowering as freely and of similar height, such as *Crimson Spray* (bright crimson); *Kilnfield White* (pure white); *Lady Salmon* (lovely coral red or deep pink); *La Perle* (white with rose blush); *Mrs H. C. Baker* (large part white); *Nancy Perry* (bright pink); *Pink Profusion* (glorious pink); *Pluie de Feu* (fiery red); *Rosamunde* (pink); *Rosea* (pink); *Rosy Gem* (pale rose); *Rubis* (bright scarlet); and *Salmon Queen* (lovely pale rose-pink).

H. sanguinea.—This species is often a shy bloomer, but bears bright almost flame-red flowers from June onwards, and averages 1½–2 ft. high. There are many excellent varieties of it flowering about the same time and averaging the same height, for instance *alba* is white, *gigantea* is a large crimson sort, *grandiflora* is similar, *robusta* is also similar, *Shirley* is a bright coral red, and *Walker's Variety* is a very large crimson and a much freer flowered sort.

HEXAGONAL AND OCTAGONAL BEDS, AREAS OF.—See AREAS OF BEDS AND BORDERS in *ARITHMETIC AND GARDENING.*

HIBISCUS.—For the best species see *SHRUBS.* For half-hardy annual species see *ANNUALS, HALF-HARDY: LIST OF.*

HICKORY.—A name applied to the genus CARYA. See *TREES.* See also under WALNUT in *NUT CULTURE.*

HICKORY NUT.—See under Walnut in *NUT CULTURE.*

HICKORY PINE (*Pinus Ayacahuite*). See *TREES.*

HIERACIUM.—See *HAWKWEED.*

HIEROCHLOË.—See *HOLY GRASS.*

HIGH BLACKBERRY (*Rubus villosus*).—See *SHRUBS.*

HIMALAYA MAY APPLE (*Podophyllum Emodi*).—See *PODOPHYLLUM.*

HIMALAYAN ALDER (*Alnus nitida*).—See *TREES.*

HIMALAYAN CYPRESS (*Cupressus torulosa*).—See *TREES.*

HIMALAYAN FIR (*Abies Pindrow* and *Pinus excelsa*).—See *TREES.*

HIMALAYAN HOLLY (*Ilex dipyrena*). See *HOLLY.*

HIMALAYAN LARCH (*Larix Griffithii*).—See *TREES.*

HIMALAYAN LILY, THE NOBLE (*Lilium giganteum*).—See *LILIES.*

HIMALAYAN POPPY.—See *MECONOPSIS.*

HIMALAYAN SPRUCE (*Picea Morinda*).—See *TREES.*

HIMANTOGLOSSUM.—Now included in the genus ORCHIS.

HIND-HEAL (*Chenopodium Botrys*).—See *CHENOPODIUM.*

HIPPEASTRUM (EQUESTRIAN STAR. Nat. Ord. Amaryllidaceæ).—This is divided into many subgenera nowadays and includes, strictly speaking, the genera *AMARYLLIS, HABRANTHUS,* and others dealt with under their well-known garden names. With the above exceptions all the species require stove treatment, and for that reason are omitted from the present edition.

HIPPOPHAE.—For the best species see *SHRUBS.*

HIPPURIS.—See *MARE'S TAIL.*

HIRCULUS. — Now included in the genus *SAXIFRAGA.*

HOARY PLANTAIN.—See *WEEDS.*

HOBBLE-BUSH (*Viburnum lantanoides*).—See *SHRUBS.*

HOEING OF CROPS. — See under GENERAL MANAGEMENT in *VEGETABLES: GENERAL CONSIDERATIONS.*

HOES.—See *GARDEN TOOLS.*

HOG'S FENNEL.—See *PEUCEDANUM*

HOGWEED (*Heracleum sphondylium*). See *HERACLEUM.*

HOLCUS (Soft Grass. Nat. Ord. Gramineæ).—This is a genus of unattractive, easily grown, hardy perennial grasses only suitable for the wild garden. *H. lanatus* and *H. mollis* are the two best known species, and grow 2–3 ft. in height.

HOLLY (*Ilex.* Nat. Ord. Aquifoliaceæ).—Apart from its use for Christmas decoration, Holly is a splendid garden shrub which should be planted more freely than it is. It makes a dense impenetrable hedge where its sharp prickly leaves dropped at pruning-time are no disadvantage, and where it is not used to separate garden from meadow it may well be applied for the purpose of separating one portion of the pleasure grounds from another.

Holly is not a shrub of difficult culture, as it thrives in all kinds of soil. Usually it is an inexpensive shrub, as the majority of nurserymen stock it in some of its numerous varieties and readily quote the price per dozen or per hundred. The best time for planting is a matter of opinion, but we favour autumn planting rather than March planting on account of the trees being able to become more firmly established before new growth commences.

For hedge work, of course, Holly must be pruned in the summer-time, and it is advisable to use sécateurs for the work instead of shears to prevent disfigurement of the leaves. Where Holly bushes are planted for other than hedge purposes, cutting may be done, of course, at the favourite time for cutting, namely, about the 25th December. It may be noted also that Holly clippings burn readily when dry and are useful to add to slow-going garden fires.

Varieties.—An enormous number of varieties of Holly are now on the market and we cannot do more than mention some of the best. The selection below, therefore, contains only the cream of the varieties. The letter *D* indicates that the variety is deciduous, while *E* indicates that it is evergreen :—

Ilex ambigua (*E*). Height, 3–5 ft.

I. Amelanchier (*E*). Height, 10–40 ft.

I. Aquifolium (*E*). Common Holly. Height, 10–40 ft.

The following are good forms :—*albo-lineata, angustifolia variegata, argentea longifolia, argentea medio-picta* (Silver Milkmaid); *argentea pendula* (Perry's Weeping Holly); *argentea regina* (Silver Queen Holly); *aurea angustifolia, aurea medio-picta* (Gold Milkmaid); *aurea pendula* (Waterer's Gold Weeping Holly); *aurea regina* (Golden Queen Holly); *ferox* (Hedgehog Holly); *flavescens* (Moonlight); *handsworthensis* (Handsworth New Silver Holly); *heterophylla, latifolia aureo-marginata, lawsoniana, lawsoniana aureo-picta, marginata, myrtiflora aurea, myrtifolia, pendula, recurva, watereriana,* and *Wilsonii.* Height, 6–20 ft.

I. Cassine (*E*). Cassena. Height, 12 ft.

I. decidua (*D*). Height, 10–30 ft.

I. dipyrena (*E*). Himalayan Holly. Height, 12 ft.

I. glabra (*E*). Inkberry. Height, 2–3 ft.

I. latifolia (*E*). Toraia. Height, 20 ft.

I. opaca (*E*). American Holly. Height, 20–40 ft.

I. verticillata (*E*). Black Alder or Winterberry. Height, 6 ft.

HOLLY FERN (*Aspidium Lonchitis*).—See *Ferns and Fern Gardening.*

HOLLY-LEAVED OSMANTHUS (*Osmanthus Aquifolium*). — See *Climbing and Trailing Plants.*

HOLLY OAK.—The same as Holm Oak.

HOLLYHOCK (Nat. Ord. Malvaceæ). Hardy perennials, 8–10 ft. high, succeeding in a strong loam which must be particularly well drained and freely manured. They are propagated by cuttings, division, grafting, and by seed.

Culture.—Though truly perennial in habit, the Hollyhock has become so liable to attacks of the well-known fungus (*Puccinia malvacea*) that many growers now treat it as a biennial, propagating solely from seed. This should be sown in May or June, either in a frame or the open border. Before the young seedlings get crowded, they should be pricked out into a prepared bed, and when well established, transplanted to their permanent quarters. If seed is sown in heat in January and the plants kept growing on without a check, many of them will bloom the same year. If the perpetuation of any special sort is desired, grafting is probably the best method. A thick piece of root is cut into pieces about 2 ins. long, and into these are inserted the young growths, which shoot from the base of the old plant in spring. The growths chosen should be 3–4 ins. long, and if potted into 5-inch pots with the soil just covering the union, they will soon form strong plants capable of flowering the same year. Or the young growths may be taken from the old plants in the spring as cuttings, and rooted in light sandy soil.

Uses.—Hollyhocks answer a similar purpose in garden decoration to the Delphinium, but flower later, namely, in August and September.

Varieties.—Prior to 1870 many societies were in existence fostering the Hollyhock as a florists' flower, and named varieties, of which there was a wide selection, were exceedingly popular. Shortly after that date, the fungus appeared, and created such havoc in practically all gardens where the plants were cultivated, that a reaction set in, and the Hollyhock lost, to a great extent, its status amongst florists. Now that seed-raised plants are so commonly sold, the named varieties have practically disappeared, but the different colours come fairly true from seed.—J. L. G.

Up-to-date Selections.

Hollyhock Double Show.—Many shades.
H. Countryside.—Crimson.
H. Palling Belle.—Silver-pink.
H. Annual.—Many colours.
H. Golden Beauty.—Yellow.
H. Rose Queen.—Rose-pink.
H. Choice Single.—Many shades.

See also *ALTHAEA* and *MEDICINAL HERBS*.

HOLLYHOCK RUST.—See *DISEASES OF PLANTS*.

HOLM OAK (*Quercus Ilex*).—See *TREES*.

HOLY GRASS (*Hierochloë borealis*. Nat. Ord. Gramineæ).—This is a useful species of hardy perennial grass for the wild garden, growing about 1 ft. high. It succeeds in almost any soil, and is easily propagated by autumn root division or spring sown seeds.

HOLY THISTLE.—See *MEDICINAL HERBS*.

HOME-MADE LAWN SAND.—See *LAWN SAND*.

HOME TESTING OF SEEDS.—See *SEED TESTING*.

HONESTY (*Lunaria annua*, Syn. *L. biennis*. Nat. Ord. Cruciferæ).—This well-known and favourite biennial plant, with its lilac, purple, or white flowers in May, June, and July, is valued chiefly for its silvery seed pods, which are dried in the same way as everlastings for house decoration in winter. It is easily raised from seeds sown any time during April, May, or June in the open garden or half-shady places. The plants are transferred in the autumn to their flowering positions, and when the soil is fairly rich often grow 3 ft. high.

A plant known as PERENNIAL HONESTY (*L. rediviva*) is sometimes grown, but it is not so ornamental as the species named above. It is a herbaceous perennial bearing pale purple scented flowers in June and July, on plants about 1 yd. in height, and requires no special culture.—J.F.

HONEY BALM (*Melittis Melissophyllum*).—See *MELITTIS*.

HONEY BEE.—See *BEES IN THE GARDEN*.

HONEY-DEW.

This is a sweet fluid secreted by aphides and scale insects. It is found very commonly on the surface of hops, lime trees, roses, and may occur wherever these pests are allowed to flourish, though it is produced more freely by certain species of aphis than others. Honey-dew serves as a nourishment both to ants and to certain fungi such as Capnodium, and Fumago. These fungi are themselves non-parasitic, but they form a thin crust over the leaf which has, as a result, a black sooty appearance, and the plants suffer through the loss of light. In the case of lime trees, the honey-dew is apparently distributed by the addition of moisture from the air, as a thin varnish over the entire surface of the leaf.

REMEDY. — The application of suitable insecticides to control the aphis and scale insect.—A. D. C.

HONEY LOCUST (*Gleditschia triacanthos*).—See *TREES*.

HONEYSUCKLE.—The genus LONICERA. See *SHRUBS*.

HONEYSUCKLE (*Lonicera Periclymenum*). — See *CLIMBING AND TRAILING PLANTS*.

HONEYWORT.—See *CERINTHE* and *TRINIA*.

HONKENYA.—Now included in th genus *ARENARIA*.

HOOF PARINGS.—See ORGANIC PRODUCTS under NITROGENOUS MANURES in *MANURES*.

HOOKERA.—Now included in the genus *BRODIAEA*.

HOOP-PETTICOAT DAFFODIL (*Narcissus Bulbocodium*).— See *NARCISSUS SPECIES*.

HOP CLOVER (*Trifolium agrarium*).—See *TRIFOLIUM*.

HOP HORNBEAM. — The genus OSTRYA and *O. carpinifolia*. See *TREES*.

HOP PLANT (*Humulus Lupulus*).—See *HUMULUS*.

HOP TREFOIL (*Trifolium procumbens*).—See *TRIFOLIUM*.

HOPLOCAMPA.—See APPLE SAWFLY in *INSECT PESTS*.

HORDEUM (BARLEY. Nat. Ord. Gramineæ).—This genus of grasses is of more use to farmers than gardeners. *H. vulgare* (Syns. *H. hexastichon* and *H. Zeocriton*) is the best known species; it is the common BARLEY of the fields, from which that curiously tasteless liquid BARLEY WATER is obtained. *H. murinum* is the BARLEY GRASS. The only species of any garden interest to us is *H. maritimum*, popularly called the SQUIRREL-TAIL GRASS. This is briefly described in our article on *ORNAMENTAL GRASSES*.

HORMINIUM (PYRENEAN DEAD NETTLE. Nat. Ord. Labiatæ).—Only one species of this is worth growing in gardens. This (*H. pyrenacium*) succeeds in a hot dry portion of the perennial border, and is propagated in the usual way by division of the plant in the autumn or early winter, and by seeds sown in the summer. It is a blue midsummer flowering plant which grows about 12 ins. high.

HORN SHAVINGS. — See "Hoof Parings" in notes on ORGANIC PRODUCTS under NITROGENOUS MANURES in *MANURES*.

HORNBEAM.—A name applied to the genus CARPINUS, and more especially to *C. Betulus*. See *TREES*.

HORNED POPPY (*Glaucium flavum*. Nat. Ord. Papaveraceæ).—The sea-green leaves of this hardy biennial are striking, and the bright yellow flowers produced from June to August, on plants 1–2 ft. high, are very showy. It is of easy culture in any good garden soil, and may be raised by sowing seeds in the open during April or May, after which it is well to transplant the seedlings to their permanent positions when they have made a rough leaf or two.

HORNED RAMPION (*Phyteuma*. Nat. Ord. Campanulaceæ).—According to the Kew Authorities the name HORNED RAMPION is limited to *Phyteuma Halleri*, but in the garden the whole of the genus is popularly known by this name, and not by that of RAMPION bestowed upon it by the Kew and other writers, since, to call it by that name would lead to it being confused with the vegetable *RAMPION* (*Campanula Rapunculus*), on which a separate article is devoted. There are a large number of species, but the genus is of no great importance and has not come very much to the fore. Propagation by seed sown in the summer, or by division of the roots in the autumn or spring, is not difficult, and planting may be successfully carried out from November to March, in any ordinary light rich garden soil.

Perennial Border Species. — We describe a few of the best below :—

Phyteuma Balbisii.—This is a useful white sort for edging purposes. It blooms from June throughout the summer, and grows about 6 ins. high.

P. canescens (Syn. *P. salignum*).—This sort bears lilac blue flowers in June or July, and averages about 1½ ft. high.

P. Carestiae.—Syn. *P. humile*, which see.

P. Halleri (Syn. *P. urticifolium*).—This attractive sort useful for edgings bears dark violet-blue flowers from May onwards, and grows 6 ins. high.

P. humile (Syn. *P. Carestiae*).—This also is useful for edging purposes. It bears pretty blue flowers in June, and averages 6 ins. high.

P. Michellii.—This is a pretty blue sort flowering in June, and growing 6 ins. high.

P. salignum.—Syn. *P. canescens* above.

P. serratum.—This is a blue summer flowering sort about 1 ft. high.

P. spicatum (Syn. *P. tetramericum*).—Paxton says this, known as SPIKED RAMPION, is occasionally eaten as an article of food. We have not tried it. It produces blue flowers from May onwards, and grows about 1½ ft. high.

P. urticifolium.—Syn. *P. Halleri* above.

Rock Garden Species.—Some of the smaller species are graceful rock-garden plants. Most of them are easy to grow in rocky soil and are propagated by seeds in the spring. We recommend the following :—

Phyteuma comosum.—This bears its leaves in a rosette. Flowers intense blue in heads. Site sunny limestone crevice. Flowering Period, July. Height, 3 ins.

P. orbiculare.—This is a tufted plant. Flowers deep blue in heads. Site open. Soil stony. Flowering Period, July to September. Height, 12 ins.

P. Scheuchzeri.—This is a biennial of light graceful habit. Flowers deep blue. Site open. Soil stony. Flowering Period, May to August. Height, 12 ins.

HORSE-BANE (*Œnanthe Phellandrium*).—See *ŒNANTHE*.

HORSE BEAN (*Vicia Faba equina*).—See *VICIA*.

HORSE-BRIER (*Smilax rotundifolia*). See *SMILAX*.

HORSE CHESTNUT.—A name applied to the genus *ÆSCULUS*, more especially to *Æ. Hippocastanum*. See *TREES*. See also under CHESTNUT in *NUT CULTURE*.

HORSE DROPPINGS. — See *HORSE MANURE*.

HORSE FENNEL.—See *SESELI*.

HORSE MANURE.

Horse manure is distinct from farmyard manure, though it is the prevailing constituent in the latter, and is more suitable for heavy soils than any other manure. There are many forms of it, upon some of the most important of which we enlarge below :—

Horse Droppings.—In large stables an effort is sometimes made to keep the droppings separate from the rest of the material, and this praiseworthy effort should be encouraged, since the droppings are the richest material of all. In their fresh state they are unsuitable save for making into liquid manure; it is after they have mellowed down in a heap for a month or so that they are so valuable for all the purposes to which horse manure is applied. Mixed with peat they form a valuable top-dressing, as is mentioned in our article on *TOP-DRESSING*, while with seaweed they form a very useful manure, as is mentioned in our article on *SEAWEED AS MANURE*. Stacked in a solid heap for twelve to eighteen months they mellow down into material almost as mild as leaf-mould or old hotbed manure. The horse droppings gathered from the roads, though useful for soils needing humus, are comparatively poor in plant food, however, and unless they can be well soaked with liquid manure and allowed to decompose for a few months are not of any great value. For use apply 3–4 cwt. per sq. rod.

Peat-Moss Litter.—On account of the great difficulty in getting straw for bedding horses on, peat-moss has been largely pressed into service, and when it becomes saturated with the urine of these animals it does not form a bad manure after it has rotted down. The droppings should be well mixed with the peat-moss for general purposes, otherwise some portions of the material will be comparatively poor while others will be very rich, and it is a good plan to arrange that the drain from the stalls in the stable shall deliver its contents on to the top of the heap of litter which has been cleared out, since otherwise material which is no longer fit for bedding purposes will be somewhat poor for the garden. Peat-moss manure may be used with success for general garden purposes, but is no good for the making of mushroom beds. For use apply 4–5 cwt. per sq. rod.

Sawdust Manure.—Horses are not infrequently bedded on sawdust, and the resulting manure is in consequence offered to gardeners. Its use is not to be commended, since the sawdust causes fungi of various kinds to come up. Where there is no other source of supply, instructions should be given to keep the droppings separate; these last can be used in the same manner as HORSE DROPPINGS (see above) so long as the soil has been previously well limed.

SHAVINGS MANURE, also, is detrimental. A few remarks on dealing with this are given under WOOD SHAVINGS MANURE below.

Strawy Manure.—This is what is usually known by the name of STABLE MANURE, and very good stuff it is when properly made, though few gardeners or stablemen know how to do this. The animals are bedded on wheat straw, the driest of which is put back with fresh straw into the stalls each day,and that upon which the animals have watered is carted out. The ideal method of making this material into good stuff is to have a large pit dug, and into this the daily stable clearings are shot, the pit being situated so that the stable drain pours all its contents on to the top, including the water used when the stables are swilled out. Instead of tipping the stuff in and leaving it as loose as it can be to ferment and burn its own heart out, the material should be shot in and distributed in even layers, lightly sprayed with strong brine and then trodden as hard as possible. The pit should be large enough to hold at least a month's supply; then it can be emptied, the top portion being thrown into the bottom and the rest carted out into a field or into the manure yard, stacked again firmly, and if possible covered with soil to which a little gypsum has been added, until required for use. We need not enlarge here on all the purposes to which stable manure can be applied, except to point out that it is about the only material of which hotbeds and mushroom beds may be successfully made. (See articles on *Hotbeds* and *Mushrooms*.) About 3 cwt. of well-rotted stable dung is quite enough for each sq. rod of ground; but rather more is needed if dug in fairly fresh in the early winter.

Wood Shavings Manure.—In any districts where wood is much worked shavings or chips are cheap and available in ever-increasing quantities. These shavings are often offered very cheaply to horse owners for bedding, and the resulting manure is, in consequence, offered to gardeners. Such material should be avoided like poison, for it is possible to ruin a garden completely by its use, more so than is the case if SAWDUST MANURE, as mentioned above, is used. Endless fungi come up year after year, for the wood chips or shavings only rot away very slowly. Heavy dressings of lime will do much to kill the fungi, but it needs something stronger, such as gaslime, to kill them completely. No one can afford to be constantly dressing his land with gaslime, as it means that land so treated must lie vacant for three or four months each year and thus valuable winter crops are lost. It may happen, however, and indeed often does, that it is a matter of taking this wood shavings manure or going without. We all know that such things happen, though it must be admitted that it is rather a case of being between the devil and the deep sea. However, if such manure must be used, the effort referred to under SAWDUST MANURE above, should again be made in the case of the present material, and the droppings kept separate. The remaining material can be treated in one of two ways: it can either be charred by means of a slow smother fire, or it may be made into a stack, and every drop of available urine or slops poured over it for three or four months. This will then cause a large proportion of the wood to rot away, but the material will be charged with fungi spores, and the use of a powerful soil fungicide either before or with the manure is very necessary to prevent disaster. The droppings can be used at the same rate as horse droppings, of course; the other can be applied at the rate of about 3 cwt. per sq. rod.

Horses are sometimes bedded on other materials, such as fern litter, damaged hay, leaves, road grass, etc., but these materials are not of sufficient importance to describe in detail.—E.

HORSE MINT or HORSEMINT.—See *MENTHA* and *MONARDA*.

HORSE MINT: AMERICAN. — See *MONARDA* and *POTHERBS*.

HORSE MUSHROOM.—See EDIBLE FUNGI in *FUNGI: EDIBLE AND HARMFUL*.

HORSE THISTLE.—See *CNICUS*.

HORSERADISH (*Cochlearia Armoracia*. Nat. Ord. Cruciferæ).—Although this plant grows most luxuriantly in soils of almost any description, it is only when a proper system of cultivation is followed that roots such as those offered for sale at first-class greengrocers need be expected. To obtain these as straight as a gun, varying in length from 1–2 ft., and about the thickness of a good walking-stick, the intending grower should not be against the trifling extra labour the preparation of a good bed involves.

Culture.—The position for the bed should be an open one, as far removed from the roots of trees as possible. Trench or double dig the ground very early in the winter, taking care to remove all stones, or other undecayable rubbish from the soil as the work proceeds.

Some time during February or March, purchase planting sets, about 9 ins. long, perfectly straight, having but a single eye, or, where what are termed "root-cuttings" are used, be sure these are planted top end uppermost, this being usually indicated by a level instead of a slanting cut. Always plant with a good wide dibber, making the hole perfectly straight and putting a little well-decayed manure at the bottom of each hole. Allow at least a foot between the rows, and from 9–12 ins. between each set. These may be covered with several inches of soil, or simply buried just below the surface.

Subsequent treatment consists of keeping the bed free from weeds, and at the end of November, taking up the whole crop, selecting the best roots for winter use, and others for making a new bed next season, care being taken to burn any bad-shaped or undersized roots. Cover those selected with dry earth for use as required.—F. R. C.

See also *MEDICINAL HERBS*.

HORSETAIL. — A perennial weed. See *WEEDS*.

HORSEWEED (*Erigeron canadensis*). See *ERIGERON*.

HORTICULTURAL ACIDS.—See *ACIDS: THEIR USES IN HORTICULTURE*.

HORTICULTURAL GLASS. — See *GLASS*.

HORTICULTURAL LAW.—See *GARDENING LAW*.

HORTICULTURAL MEASURES.—See *WEIGHTS AND MEASURES*.

HORTICULTURAL TEACHING.—See *WOMEN GARDENERS*.

HORTICULTURAL WEIGHTS AND MEASURES.—See *WEIGHTS AND MEASURES*.

HOSE PIPE.—See *GARDEN APPLIANCES*.

HOSE REELS.—See *GARDEN APPLIANCES*.

HOT BRINE.—See under SALT in *WEED KILLERS*.

HOTBED FRAME.—This is referred to in the next article.

HOTBEDS.

Although not so popular now as they were before artificial heating by hot water pipes reached its present high state of perfection, few gardeners can altogether ignore the claims of the old-fashioned hotbed, and, where the necessary material can be cheaply had, one or more of these affords ready means of raising tender greenhouse or half-hardy annuals which it would be unwise to sow in unheated greenhouses or frames until late in the season.

Where not wanted for these purposes, it is quite an easy matter to produce various out-of-season vegetables from fairly large beds made up in a sheltered corner outdoors.

Where immovable frames exist, a large hole excavated in the centre and filled with a few barrow-loads of the proper heating material affords just the bottom heat required for striking cuttings of various greenhouse or bedding plants, or giving a start to healthy cucumbers or melons for summer fruiting; frequent outside coverings of fresh material sufficing to maintain the interior of the frame at the required temperature.

For making these beds, some gardeners use nothing but manure fresh from the stables; others get satisfactory results from the use of a goodly proportion of this and fresh-gathered leaves, which for many weeks previous to use have been stored in a dry shed. Others having no manure, manage to get wonderful results from leaves alone, preference always being given to those from Beech, Oak, or Elm. It is necessary to add, however, that heat from such beds, although lasting, is slow to rise, and for this reason beds should be made up some time in advance of the date required for use.

Undoubtedly, beds made up of manure alone give the greatest heat, but unless they are of good size this heat declines so rapidly as to be positively dangerous to the occupants inside the frame. For this reason, in cold windy weather the outside should have the protection of sacks or mats, and outer linings of manure added very frequently.

Success with hotbeds depends very largely upon the proper preparation of whatever fermenting material is used, and a little extra attention is advisable.

When sufficient material has been got together to form the bed, mix this thoroughly, and make up in a conical heap. Turn it over every four or five days, and if the material is on the dry side apply a little water through a fine-rosed watering-can.

In turning the heap always endeavour to put the outside material into the middle of the heap as the work proceeds, thus making it all as uniform as possible.

After the third turning the permanent bed should be formed, and for this a good sunny position should be found, whenever possible protected from east or north winds.

Always make the bed of sufficient size to allow the frame to be placed in the centre, and leave a margin of at least 18 ins. on each side to allow the linings above mentioned being placed as required.

When completed place a good heap of soil in the centre, letting this be of a description most likely to suit whatever is to be grown upon the bed, thus ensuring it being of the proper temperature when the time arrives.—F. R. C.

[No seeds should be sown on the bed, or boxes of seeds put in the frame until the temperature of the bed has fallen to 65° F.—EDITOR.]

HOTEIA.—Now included in the genus *ASTILBE*.

HOULLETIA.—See *ORCHIDS*.

HOUMA (*Sophora tetraptera*).—See *SHRUBS* and *TREES*.

HOUND BERRY (*Solanum nigrum*).—See *SOLANUM*.

HOUND'S TONGUE.—See *CYNOGLOSSUM*.

HOUSELEEK.—A name applied to the genus *SEMPERVIVUM*, which see.

HOUSELEEK PENNYWORT (*Cotyledon chrysanthus*).—See *COTYLEDON*.

HOUSELEEK RUST. — See under SEMPERVIVUM in *DISEASES OF ROCK PLANTS*.

HOVER-FLIES. — See *INSECT FRIENDS*.

HOWEA.—For the best species see *PALMS*.

HUGUENINIA.—Now included in the genus *SISYMBRIUM*.

HUMATA.—Now included in the genus DAVALLIA, for which see *FERNS AND FERN GARDENING*.

HUMEA (Nat. Ord. Compositæ). This is a graceful and ornamental plant with fragrant foliage and drooping racemes of rosy-purple coloured flowers, and is useful for the conservatory or the flower garden in summer. It should be sown in slight heat in June, pricked out, then allowed to grow on, and shifted into larger pots as required. Good rich loam, leaf-mould, and sand is a suitable soil for the plant. Temperature required, 40–50° F.

Greenhouse Species.—*Humea elegans*.—Rosy red. Flowers in July. Height, 2–5 ft. Its variety *purpurea* is rosy-purple.

HUMMING-BIRD'S TRUMPET (*Zauschneria californica*). — See *ZAUSCHNERIA*.

HUMULUS (Nat. Ord. Urticaceæ). The best known species of this genus is *H. Lupulus*, the common HOP PLANT, famous in Kent and other counties, which is used when dried for brewing. As most people are aware, it is an easily grown perennial twining plant quite hardy in the south of England, but it requires something to scramble up or over (*i.e.* hop-poles) if it is to be successfully grown. Gardeners should note, however, that it is apt to spread at the roots, and becomes troublesome if planted among other shrubs. It may reach a height of 30 ft., when well suited, but the average height is 12–15 ft.

See also *CLIMBING AND TRAILING PLANTS*.

HUMUS.—See *MANURING: PRINCIPLES OF*, and *SOILS: THEIR ORIGIN AND NATURE*.

HUMUS FROM SEAWEED.—See *SEAWEED AS MANURE*.

HUNGARIAN OAK (*Quercus conferta*). See *TREES*.

HYACINTH (*Hyacinthus*. Nat. Ord. Liliaceæ). — **Culture.** — Hyacinths are no longer grown for the purposes of the show table, so there is no necessity for details of culture to be given for this purpose. Speaking in general terms, Hyacinths may be divided into (1) the early section made up of the Roman and so-called Italian varieties, and (2) the Dutch section. This last may again be sub-divided into (1) the large or ordinary varieties; (2) the small flowered or miniature varieties, which are really only immature bulbs three or four years old, instead of five or six years old; and (3) Prepared Hyacinths, which are bulbs treated by a special process which enables them to be forced into bloom much earlier than the non-treated bulbs. The following notes will be of interest:—

ROMAN HYACINTHS.—These should be potted in August, and if treated in the ordinary way of bulbs in pots they may then be had in flower before Christmas, and even at the end of November. Hyacinth bulbs resent being kept out of the ground less than most other kinds, and by successional potting of Romans, their season may be prolonged until the end of March or early April. It is, of course, essential to see that plenty of roots have been made before the plants are put into warmth.

Both Roman and the large spiked

varieties are particularly suitable for growing in undrained bowls or pans in fibre or sand. It does not appear to be generally known that sand or very light soil is equally as good as fibre for the rooting medium in drainless bowls. Experiments have proved that plants grown either in sand or soil flower a week or ten days earlier than those in fibre, if from the time of potting they have in every way been treated alike.

DUTCH or large spiked Hyacinths like a light porous compost in pots. They call for no special cultural remarks, except that the top of the bulb when the operation of potting is finished should be on a level with the top of the soil. Some varieties begin life by showing a light green sugar-loaf sort of bud; others from the first have the top of the young embryo flower-spike more or less exposed. It is well not to put these under fibre or sand, as they are very liable to injury. Great care, too, must be taken in watering them.

Hyacinths (not Romans) grown in pots in the usual way may be turned out in beds or borders as soon as the weather permits. After they have done flowering, and if left undisturbed, they will throw up useful little spikes for cutting another year.

Prepared or early forcing Hyacinths must be potted as soon as the bulbs can be obtained, that is in August or early September, and the usual routine followed. As soon as they have made good roots they must be placed in a moist heat of from 60–70° F., if bloom is wanted about Christmas. With less heat their flowering is delayed until the middle or end of January.

Varieties.—The varieties of ordinary miniature and prepared Hyacinths are practically the same, so only one list is given :—

ORDINARY HYACINTHS. — The following are a selection of single varieties :—

Dark Blue.—Grand Maître, Ivanhoe, King of the Blues, Marie, and Menelik.

Light Blue.—Czar Peter, Lord Derby, Perle Brilliant, Potgetier, and Schotel.

Maroon and Purple Shades.—Distinction (Claret), Lord Balfour (Rosy-mauve), and Prince of Wales (Violet, with white eye).

Pink and Rose-Pink.—Cavaignac, Charles Dickens, Jacques, Lady Derby, Maria Cornelia, and Ornament Rose.

Red Shades.—Garibaldi, General Pelissier, La Victoire, and Roi des Belges.

White Shades. — Corregio, La Franchise, La Grandesse, L'Innocence, and Madame Van der Hoop.

Yellow Shades.—City of Haarlem, King of the Yellows, and Oranje Boven (Rosy-orange).

ROMAN AND ITALIAN HYACINTHS. Roman Hyacinths (*Hyacinthus orientalis albulus*) are always pure white, and flower much earlier than any other varieties. Italian Hyacinths (*Hyacinthus romanus*) somewhat resemble Roman Hyacinths, but do not flower quite so early. There are pink, white, and blue forms in commerce.

DOUBLE HYACINTHS are now comparatively little grown in English gardens, so no list is given here.

J. J. & E. T. E.

HYACINTH : Historical Notes.

If the ordinary man in the street were asked to name a flower of Dutch origin and one indigenous to that country, it is more than probable that he would at once mention the Hyacinth. And yet, like another famous flower so largely and successfully cultivated in the Netherlands (we mean the

Tulip), this popular bulbous favourite is of Eastern origin.

There is a story that Hyacinthus, the son of a Spartan King, was beloved by Apollo and Zephyr, and as he preferred the Sun-god, Zephyr drove Apollo's quoit at his head and killed him. Apollo was so disconsolate at the death of Hyacinthus that he changed his blood into a flower which bore the dead boy's name.

Now it is only proper to observe that the name Hyacinth has, in times past, been attributed to other flowers than the one so generally known and grown in our gardens to-day. If we go back to our oldest authorities we find that *Hyacinthus orientalis*, the forerunner of the present garden Hyacinth, was introduced into Holland and grown with great success in the neighbourhood of Haarlem long before it was known to us here in England.

Among the numerous references to the flower by the older writers we may mention that it is figured and described by Clusius, Dodoens, Lobel, Matthiolus, and others, but the illustrations given by these ancient authors show that the type originally introduced has been wonderfully changed by the constant care bestowed upon it by the Dutch florists. Some of these men, like Voorhelm and Van Kampen of Haarlem, made remarkable progress in the transformation of theHyacinth from a poor weedy spike of flower to a fully clothed stem, strong, tall, erect, and well furnished with large double flowers closely arranged as we now know it, the spike forming a graceful pyramid in its many shades and colours.

We can follow the line of development and improvement very easily when we turn up the authorities. The earliest specimens figured bear only a faint resemblance to modern forms. Gerarde grew it in his garden in Holborn as early as 1596. Parkinson in his *Paradisus* deals very fully with the flower in 1629. At this period the examples begin to show some signs of amelioration, for in the Père d'Ardène's treatise on the Hyacinth there is an illustration giving great promise of advance.

With the opening of the eighteenth century, considerable movement appears to have taken place. The Père d'Ardène, a scholarly and experienced florist, wrote a series of little handbooks on the culture of flowers, one of them being devoted to the Hyacinth. Very shortly afterwards this was translated into Italian. Voorhelm, the Haarlem grower, also brought out a little work on the subject which likewise found an Italian translator, but the most important contribution to the literature of the subject in those days was St Simon's large quarto volume published in Amsterdam in 1768.

At that time Hyacinth culture was in full swing round about Haarlem, and St Simon's work, which is illustrated with ten full page plates, contains a catalogue of the Hyacinths known in the previous year. Thirteen pages, each in four columns, arranged in alphabetical order according to their colours, are given of the then known varieties, or, roughly speaking, a total of about 2500 varieties are mentioned.

The growing of the Hyacinth in our gardens, and particularly in glasses, did much to help on the work. Maddock of Walworth in his *Florist's Directory*, published in 1792, gives this flower the place of honour, as he does in his *Catalogue of Flowers*, etc., offered by him for sale. The flower had now been doubled, which form was the most highly esteemed. A criterion of the properties of a fine double Hyacinth is given, and the form is illustrated on Plate No. 1. It is curious to note in Maddock's Catalogue not only the names but the prices of some of the best varieties of the day. Many were offered at only a few shillings a bulb, but others were very expensive. For instance, *Mirabeau*, a double blue, was priced at £3, 15s.; *Impératrice Romaine*, a double white, was £4, 15s.; a double red named *Comte de la Coste* was priced at £12, 12s.; another of the same type, *Louis XVI.*, was catalogued at £10, 10s. Collections, however, ranged from 100 bulbs all different, duly named, at £8, 8s., to the same number in colours, kept separate, but unnamed, at £1, 1s.

In a very rare old folio, which was never completed, entitled *The Florists' Delight*, which was started the year previous to the publication of Maddock's *Florist's Directory*, we find some beautifully executed plates of florists' flowers, natural size. There are two Hyacinths figured: one is called *Trianon*, a fine double blue, and the other *Flos Sanguineus*, a ruddy pink. In looking at these magnificent samples of English cultivation, well over a century ago, one can almost say that the maximum of perfection had then been arrived at.

The later history of the Hyacinth, unlike that of some flowers, is quite devoid of anything sensational. The late William Paul in a lecture on this flower in 1864 refers to the number of varieties grown in Haarlem in Philip Miller's day as about 2000, but tells us that in the previous year when he paid a visit to the most exclusive bulb garden in that city he found only 700 sorts, and probably not more than 200 of those were subjects of extensive commerce.—C. H. P.

HYACINTHUS. — See *GRAPE HYACINTHS* and *HYACINTH.*

HYALOPTERUS.—See MEALY PLUM APHIS in *INSECT PESTS.*

HYBERNIA. — See under WINTER MOTHS in *INSECT PESTS.*

HYBRID BOURBON ROSES. — See *ROSE CLASSES.*

HYBRID BRIARS.—See under PERNETIANA ROSES in *ROSE CLASSES.*

HYBRID CHINA ROSES.—See *ROSE CLASSES.*

HYBRID MOUNTAIN SWEET (*Ceanothus hybridus*).—See *CLIMBING AND TRAILING PLANTS.*

HYBRID PERPETUAL ROSES.—See *ROSES FOR ALL PURPOSES.*

HYBRID SWEET BRIAR ROSES.—See *ROSE CLASSES.*

HYBRID TEA ROSES.—See *ROSES FOR ALL PURPOSES.*

HYBRID WICHURAIANA ROSES.—See *ROSE CLASSES.*

HYBRIDISING AND CROSS-BREEDING.—Every one knows that garden plants, in general, are very different from the wild forms from which they must have originated. Vegetables, fruit, and flowers have been so modified by man that in many instances they bear but little resemblance to the plants from which they have been derived. For the purposes of this article we will not trouble ourselves as to the original species of plants from which garden varieties have been obtained, but confine our attention to a brief description of the methods which have been followed in the development of useful qualities in fruit and vegetables, and in the attainment of beauty in flowers. The full discussion of the subject is quite beyond the limits of the space at our disposal.

Among all the marvellous "new varieties" that are being produced year by year, it is almost needless to say that they are "varieties" pure and simple, and not new creations. We can bring about certain changes in plants within certain limits, *but there are limits.* We can produce a plant intermediate between two existing ones, as, for example, in the case of the Loganberry, which is a "cross" between the Blackberry and Raspberry. But in the case of plants, which are altogether divergent in character, and which belong to different Natural Orders or Families, Nature calls a halt. It really comes to this: the power which brings about changes lies in Nature itself, and the directing of that power lies in man with the limitations of our present knowledge.

Selection.—Let us consider the simplest case first, that of changes brought about by Systematic Selection. Here it may at once be said that "Selection" has played a highly important part in the production of useful varieties quite apart from cross fertilisation and hybridisation.

It must have been noticed even by the veriest amateur that in the plants produced from a packet of seed, of either vegetables or flowers, there are frequently differences in the plants produced. These differences may be very marked, or so slight as to pass unnoticed. Even in seed that has been produced from one individual plant these differences arise: there is a tendency to vary or to "sport." The extent of this variation may be extremely small, but should this appeal to the mind of the keen observer as a change likely to enhance the usefulness of this particular class of plants, an immediate attempt to take advantage of it should, of course, be made. To do this the seed from the one or more plants that possesses the new characteristics is carefully saved and sown. Among the hundreds of plants thus raised there may be only a very few which come anything near the ideal; still there may be a few which are nearer to the features desired. Again, seed is saved to sow from these plants only. This time the result may give a higher percentage of the kind that is sought. More than that, the particular characteristic which was first noticed may be now more pronounced in one or more specimens. From these specimens seed is again saved and sown, and thus perhaps after many generations plants are obtained, which nearly all "come true" to the model set up; and what is more, these will have developed the characteristic first noticed far and beyond what was anticipated; and this characteristic can be maintained by careful selection year by year.

It must be clearly understood that in plant breeding the object should be the development of some *one* characteristic at a time. One does not attempt to change the habit of a plant in half a dozen directions at the same time, but it often happens that in breeding for some one desired end, other features are developed which may or may not be of use. In the former case selection for that particular feature is carried on.

For the purpose of making what has been said more clear, let us take a specific instance, namely, in Dwarf Beans. It is on record that some years ago a seedsman brought out a new form of bean pod which he thought would "go" with his customers. He gave it a name before it had been produced. He even published a description of it in his catalogue intimating that it would shortly be on sale. He told a celebrated bean breeder what he wanted, and it is an uncontested fact that in some two or three years a bean had been produced so nearly fulfilling his requirements that it came on the market with the description given it before it was "made." How could such a thing be done? Without going into actual details, the course of procedure was that of going over thousands of plants, and selecting any that had the required characteristic in the slightest degree, selecting, and re-selecting from the progeny of these, and, in addition to this, "crossing" those having the most marked tendency in the required direction.

"Crossing" of plants will be dealt with in its proper place, but here we cannot lay too much stress upon the fact that great improvements in plants may be obtained simply by selecting those having favourable characteristics. Every gardener knows that a "rogue" in a row of plants is a departure from the type, which may be much below the standard of excellence; in that case it is pulled up and thrown away, and thus "rogueing" is a most important matter. On the other hand, "rogues" may at times have some useful characters, and thus may be used as a starting-point to produce in the next generation new desirable characters in a few of their progeny, and these characters may become more pronounced in future generations, and eventually be more or less "fixed." In dealing with this matter of "rogues," it can be easily understood that where plants are grown for seed, and where the object is to produce seed that will give plants true to type, every plant that differs from this type must be destroyed before it is allowed to flower.

Cross-breeding.—Now comes the question of cross-breeding. By this is meant the transference of the pollen of one flower to the proper organs in another flower of the same species. Both the terms "Hybridising" and "Cross-breeding" are somewhat loosely used, but for the purposes of this article we will take a "hybrid" to be the result of crossing one *species* with another species of the same genus, while cross-breeding is the result of crossing two *varieties* of the same species of the same genus.

Before it is possible to carry out this work the arrangement of male and female flowers must be understood. Some subjects have all the male flowers on one plant, and all the female flowers on another, as, for instance, the willow. Then there are subjects which have male flowers and female flowers borne on the same plant, to wit, the begonia and vegetable marrow. Lastly, we have plants whose flowers individually contain both the male and female elements; for example, the fuchsia, lily, the raspberry, and hosts of others. In fact, the larger majority of plants are included in this last class.

Now before a flower can produce seed it must be fertilised by some means or other, and to this end Nature has some marvellous arrangements. This part of the subject would fill a volume, but it must suffice to say that *on the whole* these arrangements are such as to prevent self-fertilisation—that is that the pollen of a flower does not come into contact with the portion of that same flower which is to bear the seed. Briefly, Nature discourages in-breeding. The other precaution which Nature appears to take is to preserve the fixity of species, but these statements must be regarded as true only within certain limits.

The objects of cross-breeding are to produce a plant more vigorous than either of its parents, and to transmit some special characteristics of those parents to the resulting cross. Scores of examples of flowers and vegetables readily occur in our minds which have so changed during the past forty or fifty years that it is hard to believe that they have descended from such varieties as were known in those times. These have been the result of judicial cross-breeding. If, for instance, the tomato of to-day is compared with the tomato of years ago, an astonishing difference and improvement is noticeable. The same applies to beans, leeks, peas, etc.

In the floral world our great grandparents never dreamt of such things as our present-day cannas, fuchsias, geraniums, and hundreds of other marvels of the gardeners' art and genius.

How to Hybridise.—As to the methods followed in cross-breeding and hybridising any amount of printed directions are not of great value, but we will make clear the principles which govern the practice.

Let us suppose we have a fuchsia which has some peculiar beauty about it, but has a poor habit of growth. We would like to have a fuchsia possessing, more or less, this beauty, but of better habit, and perhaps better constitution. First of all then, another fuchsia whose flowers are fairly good and whose habit of growth is first class must be found, and, of course, both plants must be flowering at the same time. So many flowers of the first one just before they are about to open are selected; and in the same way so many of the other, and the heavy bursting buds of the first are carefully opened out. The pollen-bearing anthers which surround the central stigma are then removed, taking care that none of the finely divided pollen touches the stigma. With the aid of a camel's-hair brush, or fine steel scalpel, some of the pollen from the flowers on the second plant is transferred to the stigma on the plant we are dealing with, and this done, the flower is tied up in a fine paper bag so that bees and other insects cannot carry any other pollen to it. In many cases the pollen from the first plant may be used to fertilise flowers on the second, thus making a double cross in which the male element in one fertilises the other, and *vice versa.*

Sometimes hybridising and cross-breeding are done with a still more specific object in view, for instance, if a new pea is wanted which is both very hardy and very dwarf. In this case two parents have to be chosen each containing one of the specific characteristics it is desired the cross shall contain. All that there remains to be done is to cross and re-cross, the resulting product being selected and re-selected, and in a very few years the desired result will be obtained.

It may be pointed out in conclusion that in many cases plants closely allied as to species will not cross, and that many insuperable difficulties crop up. Those wishing to follow up this work would do well to seek information at the various Horticultural Departments of the University Colleges now fortunately so numerous. A practical demonstration will teach more than many weeks or months of reading.

W. G. W.

See also *PLANT PHYSIOLOGY* and *SEED SAVING.*

HYDRAECIA. — See POTATO STEM MOTH in *INSECT PESTS.*

HYDRANGEA (Nat. Ord. Saxifragaceæ).—This is a genus of hardy and half-hardy flowering shrubs, averaging 2–10 ft. in height. They thrive in sandy soil and are best propagated by cuttings.

Culture. — Cuttings taken in August and potted at once into 3-inch pots in sandy soil will form flowering plants in a year's time.

Short, unflowered shoots should be chosen, and they must be kept close and shaded till rooted. The plants should be wintered in a frost-proof frame or cool greenhouse, and be potted on in the spring as required. To turn the flowers blue, water with a solution of sulphate of iron, putting ¼ oz. of the chemical into a gallon of water.

Uses.—For conservatory decoration, as specimen plants on terraces, lawns, etc., and for planting out in beds during summer, the plant has long been popular. The fact that its period of bloom (August and September) is rare among flowering shrubs, and the great length of time over which the flowers remain in condition, justifies the attention bestowed on it. In the south of England and other mild parts of the British Isles all the species are quite hardy, and *H. paniculata* is hardy in all parts of the country.

Varieties.—The following hybrids are derived from *H. hortensis*: Beauté Vendomoise, Générale Vicomtesse de Vibraye, Lilie Moullière, Mlle Rénée Gaillard, Mme Moullière, Radiant. They are all well worth growing, as also is *H. paniculata*.

J. L. G.

See also *CLIMBING AND TRAILING PLANTS* and *SHRUBS*.

HYDRAULIC CEMENT.—See *MORTAR*.

HYDROCHLORIC ACID.—See *ACIDS: THEIR USES IN HORTICULTURE*.

HYDROCOTYLE (PENNYWORT. Nat. Ord. Umbelliferæ).—This is a genus of hardy plants for the wetter portions of the wild garden. *H. vulgaris* is the best known species. It is the COMMON PENNYWORT, a wild plant of little value. As there are many better things we do not propose to describe any species here.

HYDROCYANIC ACID.—See *ACIDS: THEIR USES IN HORTICULTURE*.

HYDROCYANIC ACID GAS.—See *INSECT PESTS: GENERAL METHODS OF DESTRUCTION*.

HYDROFLUORIC ACID and HYDROFLUOR-SILICIC ACID.—See *ACIDS: THEIR USES IN HORTICULTURE*.

HYDROGEN SULPHATE OF SODA.—See SODIUM HYDROGEN SULPHATE in *SODA AND SODIUM COMPOUNDS*.

HYDROPHYLLUM (WATER-LEAF. Nat. Ord. Hydrophyllaceæ).—This is a genus of dwarf plants suitable for the wetter portions of the wild garden or for the bog garden, growing as a rule about 6 ins. high. ***H. virginicum***, popularly known as SHAWANESE SALAD, is probably the best known species. Two others grown at Kew are ***H. appendiculatum*** and ***H. canadense***. The first two of these species bear blue flowers, the last white, and all bloom from May to July.

HYDROXIDE OF CALCIUM and HYDROXIDE OF LIME.—See CALCIUM HYDROXIDE in *LIME COMPOUNDS*.

HYDROXIDE OF POTASH.—See POTASSIUM HYDROXIDE in *POTASH AND POTASSIUM COMPOUNDS*.

HYDROXIDE OF SODA.—See SODIUM HYDROXIDE in *SODA AND SODIUM COMPOUNDS*.

HYGROMIA.—See under SLUGS AND SNAILS in *INSECT PESTS*.

HYLEMIA.—See CARNATION MAGGOT in *INSECT PESTS*.

HYLOBIUS.—See PINE WEEVIL in *INSECT PESTS*.

HYLURGUS.—See PINE BEETLE in *INSECT PESTS*.

HYMENANTHERA.—For the best species see *SHRUBS*.

HYMENOCALLIS (Nat. Ord. Amaryllidaceæ).—This is a genus of hardy and half-hardy bulbs of easy culture, requiring no more than the usual treatment bestowed on such subjects. A rich light loam is the best, and propagation may either be effected by seeds or by little bulbs in the usual way.

They should be planted about three times deeper than the diameter of the bulbs and covered with litter in October.

What to Grow.—The following bear white flowers from May to August, and average 12–24 ins. in height. For detailed descriptions larger works must be consulted: *H. bistubata*, *H. calathina*, *H. grandiflora*, *H. glauca*, *H. lacera*,[1] *H. littoralis*,[1] and varieties; *H. Palmeri* and *H. tenuiflora*. *H. Amancaes*[1] is light golden-yellow. A number of stove species are purposely omitted.

HYMENOPHYLLUM.—For the best species see *Ferns and Fern Gardening.*

HYMONOMUTIDÆ. — See Little Ermine Moths in *Insect Pests.*

HYOSCYAMUS (Henbane. Nat. Ord. Solanaceæ).—This is an unimportant genus of annuals and evergreens of no garden value and of weedy appearance. The best known species is *H. niger*, known as Common Henbane, or merely as Henbane, an intensely poisonous plant described under the latter name in our article on *Medicinal Herbs.*

HYOSERIS (Nat. Ord. Compositæ). This is an unimportant genus of hardy herbaceous plants of very easy culture, but of little value for the garden. The best known species is *H. foetida*, or Swine's Succory, a plant sometimes given a place in the borders, but quite undeserving of such an attention.

HYPERICUM (St John's Wort. Nat. Ord. Hypericaceæ).—This is a large genus of shrubby greenhouse evergreens, hardy deciduous shrubs, hardy annuals, hardy herbaceous perennials, and hardy evergreen rock plants. The first three sections are excluded as being beyond the scope of the present work. The hardy herbaceous perennials are of excessively easy culture, useful alike for shady portions of shrub borders, mixed borders, rock borders, and in the wild garden. They practically grow themselves when once planted in light, rich soil, to which a little peat and leaf-mould have been added. They are easy to propagate by division of the roots in March or by seeds in the early summer, while the best planting period is February and March. We recommend the following sorts from the large number which have been described, all of which are hardy :—

Hypericum crispum.—This is a yellow sort blooming in June and July, which grows about 12 ins. high.

H. decussatum.—Syn. *H. orientale ptarmicaefolium*, which see.

H. hirsutum.—This is a useful sort bearing yellow blooms from June to August, and growing 1 ft. high.

H. linarifolium.—This is a pretty yellow species blooming from midsummer to the end of August, and growing about 12 ins. high.

H. montanum.—This is another useful yellow-flowering species. It blooms from June to August, and grows about 1½ ft. high.

H. orientale.—This and its variety *ptarmicaefolium* (Syn. *H. decussatum*) are two very useful yellow-flowering species blooming from midsummer to the end of August, and averaging 1½ ft. in height.

H. perfoliatum.—This and its variety *latifolium* are a couple of dwarf-growing yellow sorts blooming in July, and rarely exceeding 12 ins. in height.

---

[1] These are the only hardy species, and even they cannot be regarded as hardy except in the warmest parts of the United Kingdom.—Editor.

H. pulchrum.—This is a pretty dwarf yellow sort blooming from June to August, and averaging 12 ins. in height.

H. tomentosum.—This is a late blooming dwarf yellow sort only coming into bloom in August and September, and averaging 9–12 ins. in height.

Rock Garden Species.—These are very pretty evergreens which will thrive very well if well-drained loamy soil is provided. They are best propagated by means of seeds sown in gentle heat in March. We recommend the following :—

Hypericum Coris.—This is a dwarf, tufted evergreen. Flowers rich yellow. Site sunny. Soil sandy loam. Flowering Period, May to September. Height, 3 ins.

H. nummularium.—This is a trailing species. Flowers bright yellow in racemes. Site sunny. Soil sandy loam. Flowering Period, June to September. Height, 3 ins.

H. olympicum.—This is a handsome greyish-leaved evergreen. Flowers large yellow. Site sunny. Soil light loam. Flowering Period, June to September. Height, 9 ins.

H. polyphyllum.—This is merely a small edition of above with yellow flowers. Height, 4 ins.

H. reptans.—This is a trailing plant with evergreen foliage. Flowers golden-yellow. Site bright sunny. Soil ordinary loam. Flowering Period, July to September. Height, 3 ins.

NEW VARIETY.

Hypericum læve-rubrum.—A new St John's Wort from Asia Minor, with orange-scarlet flowers, dark green leaves, and creeping stems. It is very suitable for rock garden culture.

See also *SHRUBS.*

HYPOCHLORITE OF CALCIUM.—See CALCIUM HYPOCHLORITE IN *LIME COMPOUNDS.*

HYPCHOERIS (Nat. Ord. Compositæ).—This is a genus of plants popularly known by the name of CAT'S EAR, and well known to pig breeders on account of being of food value to their stock. The plants are chiefly weedy hardy perennials of no garden value but of very easy culture. Four species are grown at Kew: of these *H. maculata* is sometimes found in large herbaceous borders when the collection is extensive, but otherwise the genus may be dispensed with. The species named bears yellow flowers from June to July, and grows about 12–18 ins. high.

HYSSOP (*Hyssopus officinalis*).—See *HYSSOPUS* and *POTHERBS.*

HYSSOPUS (Nat. Ord. Labiatæ). This is an unimportant genus of hardy evergreen bitter herbs which are sometimes planted in the herbaceous border instead of being kept in the kitchen garden or herb border. The species most often grown is *H. officinalis*, known as HYSSOP, a few remarks on the culture of which appear in our article on *POTHERBS.*

I

IBERIS.—See article on *CANDYTUFT.*

ICE PLANT. — See *Mesembryanthemum crystallinum* and *Tetragonia crystallina* in *MESEMBRYANTHEMUM* and *TETRAGONIA.*

ICELAND POPPY (*Papaver nudicaule*). See *POPPIES : PERENNIAL BORDER* and *ROCK GARDEN SPECIES.*

ICHNEUMON-FLIES. — See *INSECT FRIENDS.*

ICICLE.—A variety of RADISH is known by this name. See *RADISH.*

IGNEOUS ROCKS.—See under KINDS OF ROCKS in *GARDEN GEOLOGY.*

ILEX.—For the best species see *HOLLY.*

ILLECEBRUM (Nat. Ord. Illecebraceæ).—One species of this (*I. verticillatum*) is known as KNOT GRASS, and is a hardy annual plant of weedy appearance and of no garden value. It must not be confused with the KNOT GRASS or COMMON KNOT GRASS described in our article on *WEEDS*, botanically known as *Polygonum aviculare* which is in every way quite distinct.

ILLICIUM.—See under ANISEED in *MEDICINAL HERBS.*

IMANTOPHYLLUM.—A synonym for *CLIVIA*, which see.

IMMORTELLE.—See under HELIPTERUM and XERANTHEMUM in *EVERLASTING FLOWERS.*

IMPATIENS.—See *ANNUALS, HALF-HARDY : LIST OF*, and *BALSAM.*

IMPERATORIA.—Now included in the genus *PEUCEDANUM.*

IMPERIAL HEAPED MEASURE.—See under MISCELLANEOUS MEASURES in *WEIGHTS AND MEASURES.*

IMPERMEABLE BEDS. — For the meaning of this term see *GARDEN GEOLOGY.*

IMPROVED HEADING CHINESE CABBAGE.—See *CHINESE CABBAGE.*

IMPROVING SOILS.—See *SOIL IMPROVEMENT.*

INARCHING.—See GRAFTING in *PROPAGATION OF PLANTS.*

INCARVILLEA (Nat. Ord. Bignoniaceæ).—Although grown only to a limited extent, several species of this genus are well worth including in the herbaceous border as they are rather attractive hardy perennials, bearing Gloxinia-like flowers. They succeed in common, rich, light, well-drained soil in a sunny site, and may be propagated in the usual way by seeds sown in the spring and summer, or by division of the roots in the autumn or spring, at which times they may be successfully planted. A novel way of increasing one's stock is to slip off the young growths which form so freely just above the rootstock in the summer, and dibble these in as cuttings under a handlight in very sandy soil. The following is a selection of the best hardy sorts :—

Incarvillea brevipes.—This is a good sort with purple flowers blooming from June to September, and growing about 1 ft. high.

I. compacta.—This is a pretty purple sort blooming from June to September, and averaging 1–1½ ft. in height.

I. Delavayi.—This is the most popular and widely grown sort. Various forms of it bear rosy-carmine, deep purple, and lilac-purple flowers respectively. The blooming period extends from June to September, and the plants grow 1–2 ft. high.

I. grandiflora.—This sort frequently offered in nurserymen's lists may be synonymous with *I. Delavayi.* It bears deep rose-red flowers from June to September, and averages 12 ins. in height.

I. Olgae (Syn. *I. Koopmanni*).—This, though not very hardy, is a handsome sort, bearing large bright rose-pink flowers not unlike Pentstemons, from June to August, and growing 2½–4 ft. high.

I. variabilis.—This useful sort requires a warm spot. It bears attractive and somewhat vivid rosy-purple flowers in July and August, and grows 12–18 ins. high.

INCENSE CEDAR (*Juniperus thurifera,* the genus LIBOCEDRUS and *L. decurrens*).—See *TREES*.

INCENSE JUNIPER (*Juniperus thurifera*).—See *TREES*.

INCREASED PRODUCTION ON ALLOTMENTS.—The above subject has for many years been gradually asserting its importance, but the sudden emergency created by the Great War served to place it in the front rank. Some hints were undoubtedly gained from the booming of "French Gardening" a few years ago, but that system has made little headway in England on account of the outlay required. It was rather a fuller development of English Gardening that was called for, and this has in many cases been brought about.

Whilst allotments could be fairly looked upon as an old institution in many parts of the country, there was abundant evidence that a full use of them was not made. In proof of this, attention need only be called to the general bareness of many plots from September until spring. This state of affairs was slowly improved during the thirty years before 1914, but under recent conditions a more rapid improvement has been noticeable. Many new allotment holders, especially in our towns, have been quick to learn lessons bearing on increased production. This in turn has served to stimulate workers in the country, and there is a great future before all amateur food growers so long as work is not relaxed but further effort made. Plots can produce double or treble what they are doing, provided the right line is taken.

How to Obtain It.—What we have just said sounds quite impossible, but we shall now point out how to go to work.

In the first place, work has often been hindered by a water-logged soil. Under such conditions a full yield of produce is quite impossible. "Cold" and "late" are the expressive words applied to these plots. Deep digging is often of some assistance in view of this difficulty. Open trenches are also of great value, but in bad cases nothing but drain pipes will be satisfactory.

Next undoubtedly comes the value of good spade work, carried out in dry weather, and October being the commencement of the gardening year, digging started then serves to expose a larger surface to air and frost. This is invaluable, in view of seed-sowing in early spring. The depth of digging naturally depends partly on the worker's available time, but a double depth is to be strongly recommended, since no one can expect to increase his production unless he digs well and deeply.

The necessity of an occasional supply of lime must next be noted on account of the varied purposes it serves. On sour soil it has been known in the same season to treble the yield of crops, and on all soils, save those resting on chalk or limestone, it will help the crops greatly and thus make them give greate return than they otherwise would.

If the greatest possible yield i to be obtained from the land, ful use must be made both of artificial fertilisers and natural anima manures. Very often a timely application of the former will increas the yield by one-third, and no one can expect reasonably good results unless he buries some dung in his land from year to year.

Other important ways of increasing production are found by the use of Catch Crops, Double Cropping, Rotational Cropping, and Successional Cropping. For particulars of these other articles must be consulted. Lastly, every gardener who desires to get more from his plot should study good gardening from the best authorities available, neglecting neither the scientific nor the practical aspect.—C. W.

INCURVARIA. — See SHOOT AND FRUIT CURRANT MOTH in *INSECT PESTS*.

INDELIBLE INK.—For prescription see INK in *GARDEN LABELS*.

INDIAN AZALEA (*Azalea indica*).—See *AZALEA: HARDY SPECIES*. See also under *Azalea indica* in *RHODODENDRON*.

INDIAN BEAN.—The genus CATALPA and *C. bignoides*. See *TREES*.

INDIAN CEDAR (*Cedrus Deodara*).—See *TREES*.

INDIAN CORN (*Zea Mays*). — See *MAIZE, or INDIAN SUGAR CORN*, and *ZEA*.

INDIAN CURRANT (*Symphoricarpus orbiculatus*).—See *SHRUBS*.

INDIAN FIG (*Opuntia ficus indica*).—See *CACTI*.

INDIAN HORSE CHESTNUT (*Æsculus indica*).—See *TREES*.

INDIAN PHYSIC (*Gillenia trifoliata*).—See *GILLENIA*.

INDIAN PINK (*Dianthus chinensis*).—See *DIANTHUS*, and *INDIAN PINKS AND JAPAN PINKS*.

INDIAN PINKS AND JAPAN PINKS (*Dianthus chinensis*. Nat. Ord. Caryophyllaceæ).—The genus Dianthus contains some two hundred species, more or less, of perennials or sub-shrubby plants, and a number of species are treated in the article on *DIANTHUS*. *D. chinensis* is best sown as an annual in heat, or in a cold frame during March, and planted out in May, when it will bloom from July till frost occurs. As a biennial it may be sown in June or July, and thinned to bloom the following year. The small flowered sort (*D. chinensis*) is known as the Chinese or Indian Pink, though it does not come from India; and the large flowered and fringed strains (*D. c. Heddewigii*) as the Japan Pink. The flowers are exceedingly variable in colour from white to carmine and crimson, often beautifully marked and laced, and single or double.

What to Grow.—*Dianthus chinensis* can be had in many colours both single and double. It flowers freely from July to October, and averages 9–12 ins. in height.

D. chinensis Heddewigii[1] can also be had in many brilliant colours both double and single. It blooms freely from July to October, and averages 6–15 ins. in height. Some of the best varieties of this include *Atkinsoni*, a single, blood-red garden hybrid blooming from July to August; *Brilliant Fringed*, a single-flowered strain with many intense colours, coming in from July to October; *Crimson Bells*, also single, and blood crimson, coming in about the same time; *Diadem*, a true double, many-coloured sort blooming from July to October; *Salmon Queen*, a single sort producing salmon-pink fringed flowers from July to October; *Scarlet Queen*, also single, but bearing vivid scarlet flowers from July to October; *Sutton's Superb*, a splendid single sort available in many colours, and blooming about the same time as the above; *The Bride*, a single white sort, the flowers of which are zoned crimson or purple, and which are produced freely all the summer; *The Mikado*, a fine single or semi-double sort, producing finely fringed flowers from July to October; and *Vesuvius*, a further sort available in many glorious colours from scarlet to orange, the flowers of which are finely fringed, and produced freely all the summer and well into the autumn.—J. F.

---

[1] Often offered by the trade as *Dianthus Heddewigii*.—EDITOR.

INDIAN POKE (*Phytolacca acinosa* and *Veratrum viride*).—See *PHYTOLACCA* and *VERATRUM*.

INDIAN SHOT.—A popular name for the CANNA.

INDIAN SILVER FIR (*Abies webbiana*).—See *TREES*.

INDIAN SUGAR CORN.—See *MAIZE, or INDIAN SUGAR CORN*.

INDOOR CULTURE: ROCK PLANTS FOR. See *ALPINE HOUSE*.

INDOOR FRUIT.—See *CUCUMBER, MELON, PEACHES, VINES*, etc.

INDOOR GARDENING.—See *SPRING GARDEN, THE*.

INDOOR TULIP CULTURE. — See *TULIPS*.

INJURIOUS WORMS. — See WIREWORMS, etc., in *INSECT PESTS*. See also *WORMS*.

INK.—See *GARDEN LABELS*.

INK STAINS.—See *GARDEN LABELS*.

INKBERRY (*Ilex glabra*).—See *HOLLY*.

INORGANIC MANURES.—See *MANURING: PRINCIPLES OF*.

INORGANIC MATTER.—See *CHEMISTRY FOR GARDENERS*.

INSECT FRIENDS.

Insects as a group are looked upon by gardeners as enemies and pests, and many of the families most abundantly represented in gardens justify by their habits this bad opinion. Some of the common insects of the garden are, however, distinctly beneficial, and it is desirable that these should be recognised as friends so that, as far as possible, they may be accorded protection and encouragement. There can be no doubt that many members of the groups briefly described in this short article are of great service in destroying such injurious garden pests as caterpillars and green fly, to the extent of keeping their numbers from becoming permanently excessive. Predaceous insects cannot be expected, however, to exterminate the plant-eating creatures on which they feed; for any approach to extermination the gardener must make vigorous use of insecticides and soil fumigants.

Beetles.—The order of the *Coleoptera* or Beetles, which includes many destructive insects—chafers, weevils, and wireworms for example—comprises several families, most of whose members are undoubtedly allies of the gardener. Of these the more important are the ground-beetles and the ladybirds.

GROUND-BEETLES (*Carabidæ*).—These are beetles of active habit, with relatively long legs, that give them the power of running swiftly, and with the strong biting jaws or mandibles, sharp at the tip, enabling them to seize on the plant-eating insects which serve as their prey. In all beetles the fore-wings (elytra) are hard and firm, protecting the delicate, membranous hind-wings; in most of the ground-beetles these latter are reduced so as to be useless for flight, and the excessively strong fore-wings form a sort of armoured deck over the insect's hind-body. Thus beetles of this family present a very characteristic appearance as they run about in pursuit of creatures weaker than themselves. Some spend the day lurking under stones and go hunting by night, but others display their activities in the bright sunshine. The grubs or larvæ of ground-beetles have elongate, well-armoured bodies with three pairs of fairly long legs, each foot bearing two claws. They also get their living by chasing and catching smaller insects. Many kinds of common ground-beetles live in gardens, so that they must devour a large number of plant-eating insects. It is well, however, to remember that the feeding habits of some members of this family are at times abnormal, and then they gnaw roots and stems instead of hunting for insect prey.

LADYBIRDS (*Coccinellidæ*).—The appearance of these stout, rotund little beetles with their conspicuous pattern of spots—red or yellow or black—is familiar to every gardener. They afford a great contrast to the ground-beetles, having short legs with only three segments on each foot, instead of the five usual in most beetles. These ladybirds are of the greatest service to the cultivator of the soil, as their food consists of "green fly" (aphis), scale-insects, and other destructive pests which suck sap from plants. The grubs of the ladybirds have the same feeding habits as the perfect insects; they have groups of strong spines on their somewhat elongate, tapering bodies, which are often marked with black and yellow spots, and six legs of moderate length. Being found in numbers on plants infected with "green fly," they are not infrequently mistakenly regarded by persons unfamiliar with their appearance as the cause of the damage. The more abundant the green fly, the greater, as a rule, will be the ladybird population on any plant, since a rich food supply is thus provided for the voracious ladybird grubs, which, under favourable conditions, develop so quickly that the whole series of transformations from egg to perfect beetle may be passed through in a month.

Hover-Flies (*Syrphi*). — Most members of the vast order of the *Diptera*, or Two-winged Flies, are looked upon as harmful insects, for many are blood-suckers and disease-carriers in the perfect winged state, or feed on plant tissue or as parasites in animals during the larval stage. One conspicuous and beautiful group of these insects is, however, distinctly beneficial, as the larvæ—like the ladybirds just described—feed on "green fly." These hover-flies are allies of the well-known house-fly and bluebottle family; they have shining and metallic bodies, often adorned with yellow bands so that they resemble small wasps. By the rapid beating of their delicate gauzy wings, they poise themselves in the air, where they may often be seen hovering over the flowering plants along a sunny garden border. In the perfect winged state they feed on the juices of flowers, and are of no great economic importance; from the eggs which they lay on plants are hatched the curious larvæ which must be reckoned among the most valuable of "garden friends." Hover-flies belong to the large assembly of the *Diptera* which have the degraded larval form known as the maggot—without legs, without a definite head, and usually tapering to the front end, where is situated the mouth armed with strong hooks for tearing up the food. The maggot is seen in its typical form in the soft, whitish offspring of a house-fly or bluebottle; in the young of a hover-fly we see a maggot with a comparatively firm body, protected by rows of strongish tubercles, able to move actively about on the leaves of the plant which it inhabits, impaling aphides on its mouth hooks, and sucking out their juices. In this way the hover-fly larva helps to keep the numbers of "green fly" within bounds, but just because they are most numerous on plants badly affected, and their mode of life is not familiar to many gardeners, they are often mistakenly destroyed instead of being recognised as friends and preserved.

Ichneumon-Flies.—Several families of *Hymenoptera,* known generally as Ichneumon-flies, are perhaps the most important of all the gardener's insect friends. The Hymenoptera are characterised by two pairs of narrow membranous wings, jaws adapted both for biting and sucking, and an elaborately formed ovipositor, or egg-placer, in the female, modified into a sting in many families. The division of the order which includes the ichneumon-flies (as well as ants, bees, and wasps) is distinguished by a very slender waist in the middle of the body of the winged insect, and by the absence of legs in the grub or larva. Ichneumon-flies have the waist region of the body particularly long and narrow, and the female's ovipositor comes off beneath the abdomen, not at its extreme tip as appears to be the case in wasps and bees. The female ichneumon lays her eggs in the bodies of other insects—usually in the caterpillars of moths and butterflies — piercing the skin with her ovipositor; the legless grubs hatched from their eggs devour the caterpillars internally, so that they perish before completing their transformations. In this way the numbers of destructive, leaf-eating caterpillars are kept within bounds. Many ichneumons are of large size, and of these one or a few grubs only feed in a single caterpillar, but there are multitudes of tiny ichneumons of whose grubs a large number may inhabit one caterpillar of fair size. A well-known example of this latter arrangement is seen in the caterpillars of the White Cabbage Butterflies (among the most destructive of all garden insects), which are attacked by a small black ichneumon *Apanteles glomeratus.* The female of this fly lays thirty or more eggs in a single caterpillar; when the little ichneumon grubs have finished their destructive work they eat their way out and spin golden-coloured silk cocoons around the shrivelled body of their victim. The gardener who knows the history of these cocoons will, of course, be careful never to crush or injure them.

The victims of ichneumons are by no means restricted to caterpillars. Many kinds of aphides or "green fly" are attacked by small flies allied to *Apanteles.* An aphid that has been destroyed by one of their grubs shows a curious rotund, swollen aspect, a circular hole through which the parasite emerged being conspicuous in the brown hardened skin.

Lacewing-Flies.—These are insects of the order *Neuroptera,* with two pairs of ample membranous net-veined wings and biting jaws. Their active grubs live on plants infected with aphides, among which they wander, and on which they prey. The lacewing grub has long slender mandibles, on which the aphid is impaled and its juices sucked out. Some of the "aphid lions"—as these lacewing grubs are sometimes called—attach the shrivelled skins of their victims to the tubercles that cover their bodies, so that they wander around like the primitive human hunter attired in the spoils of the creatures that they have slain and devoured.

G. H. C.

INSECT PESTS.

[The following article gives a brief description and means of treatment for all the more common and important garden pests, and the gardener is not often likely to meet with those which are excluded.—Ed.]

American Blight. See Woolly Aphis.

Ants (*Formicidæ*).—Ants, of which there are many kinds, are very harmful. They cause annoyance by making hills in field and gardens; they damage seedlings, etc., by their workings in the soil, and carry Aphides from place to place, thus starting new centres of attack. They may also damage soft fruit and certain plants by devouring them. Soil may become so infected that it is almost valueless; on the other hand, Ants may reclaim barren land, such as shingle, by their bringing small material to the surface, and so commence the formation of soil.

TREATMENT.—Trace out the nests, and either dig in naphthalene, or pour in boiling soap and water. Tanglefoot bands will prevent them carrying Aphides from one tree to another. White arsenic mixed with honey and put in saucers near their runs will drive them away, or the ground may be watered with a solution of 4 oz. carbolic acid per 20 gallons of water.

Aphis. See APPLE APHIDES and ROSE APHIDES.

Apple Aphides (*Aphis malifoliae*, etc.).—Apple foliage is often badly curled and scorched by this purple and pink Aphis, which is covered with meal. Two green kinds also occur, namely, *Aphis pomi* and *Siphocoryne avenae*. They all winter on the apple in the egg stage. *A. malifoliae* flies in summer to plantains, etc., *S. avenae* to oats. *Aphis pomi* occurs all the year on the apple and pear trees.

TREATMENT.—For the leaf curler spray with lime and salt just as the buds are commencing to burst. For the others spray with nicotine and soap when seen on the leaves or blossom.

Apple Blossom Weevil (*Anthonomus pomorum*).—This is a reddish-grey weevil, about a quarter of an inch long, with a V-shaped pale mark on the back, and with a long curved snout and elbowed feelers. It hibernates under the bark of trees and in the soil from which it comes out in spring, when it lays its eggs in the blossom buds before they open out. Attacked blossoms never develop, but the petals remain closed and turn brown. This is what is known as "capped blossom." The white maggot changes to a yellow pupa in the dead blossom, and the weevil eats its way out when hatched.

PREVENTION.—Keep the trees clean. Jar off the weevils when they are placing their eggs on to tarred sheets and spray with lime salt wash. Keep poultry on infested land.

Apple Sawfly (*Hoplocampa testudinea*).—The maggot of this Sawfly may easily be mistaken for that of the CODLING MOTH (which see) as it lives inside the young apples and quickly ruins them. It can, however, be at once distinguished from the latter by the greater number of pro-legs, their more curved position, and feebler movements. It works also in a somewhat different manner. The adult or Sawfly, which is somewhat similar to the CURRANT AND GOOSEBERRY SAWFLIES (which see), lays her eggs in the opened blossoms, and the maggots hatching from them mature in the young fruitlets. More than one fruitlet may be spoiled by a single larva. On reaching maturity the maggots fall to the ground and remain as such in the soil until the spring, when they pupate. There is normally only one brood a year.

PREVENTION.—Pick off and destroy all attacked fruitlets showing holes in them, and well cultivate the land under the trees.

Apple Sucker (*Psylla mali*).—A small green insect with four transparent wings about the size of an Aphis, from whch it can be distinguished by its skipping movements.

Eggs are laid in the autumn near the buds of apple trees, and are just visible to the naked eye. These hatch at the time of the bursting of the buds, and the young enter them and feed by suction. The insects are flattish, at first rather dark, but become green: from their bodies they exude fine pale threads and little mealy globules. Blossom trusses are speedily ruined by them. Later, nymphs are formed with wing buds and more of the woolly excrement. They become winged in June.

Prevention and Treatment.—Spray the trees in February with lime and salt wash. During an attack spray with nicotine and soap.

Asparagus Beetle (*Crioceris asparagi*).—This is a beetle a quarter of an inch long, which is of dark bluish-green colour. It has a rusty red thorax with yellow patches on the wing-cases, and red edges to them. It hibernates under rubbish during the winter, coming out in the spring to lay its dark brown eggs on the shoots. In four to ten days larvæ hatch out; they are a dirty olive-green colour, and have six black legs. They have a pair of foot-like tubercles on each segment, and an anal pair by which they hold on to the plant. In a fortnight the larvæ are mature, and fall to the ground to pupate, the yellow pupæ giving rise to the beetles in a fortnight or three weeks. The later broods lay their eggs on the fronds, at right angles to the surface, and the larvæ strip the feathery growth.

Prevention and Treatment.—Turn ducks on beds attacked. Spray the fronds with arsenate of lead to kill the larvæ.

Asparagus Fly (*Platyparea poeciloptera*).—This is a small fly of brown colour with four light bars on the body and the wings. It has brown markings much like the Celery Fly (which see), and is about the same size. It occurs locally from April to June, and lays eggs beneath the scales of the asparagus heads. The larvæ bore into the young shoots and stalks of the fronds, and eat downwards. They all pupate in winter, and hibernate in the underground portions of the stems.

Treatment.—It is said that if rods dipped in any sweet sticky substance are put in the soil the flies alight and are caught, but in any case all injured shoots should be destroyed.

Bean Aphis (*Aphis rumicis*).—This Aphis, which is often called Black Army, Black Fly, or Collier, frequently causes much loss in beans, and may attack peas, as well as many other plants, such as docks, dahlias, poppies, and the spindle tree (*Euonymus*). It winters on the spindle (*Euonymus sp.*), and also lives on docks (*Rumex*) in the egg stage. The eggs hatch in the spring, and the insects eventually become winged, some flying to poppies, others to docks, and last of all to beans, where they settle on the tops of the plants, soon commencing to produce wingless living young. These soon do the same, until the tops of the plants get covered with a black, sticky mass which spreads down to the pods. As the beans ripen off the aphides fly to docks, poppies, thistles, etc., and later back again to the spindle tree.

Prevention and Treatment.—Destroy as far as possible all docks and poppies and spindle trees. Pinch the tops out of broad beans and burn them, to prevent the attack starting, remembering that the young can only live in the young tender top growths. When present dust with Belumnite, or spray with soft soap and quassia, having previously picked off the worst infected heads.

Beet Carrion Beetles (*Silphidæ*).—Two blackish beetles known as *Silpha opaca* and *S. atrata* destroy mangolds and sugar beets abroad, but in this country they are of little importance. The beetles are about half an inch long; they are flattish, and when fresh are covered with reddish-brown down. This, however, is soon rubbed off and the body appears black. In *S. opaca* the elytra have each three ridges, and between the second and third ridge is a black spot, and the tip of the body is tawny. *S. atrata* is black and shiny. The beetles hibernate, and are normally carrion feeders; they now and then attack mangolds and beets in the larval stage. The larvæ are dark, flattish, and broad, similar to Woodlice in form—but flat, with the sides of the body notched, about two-fifths of an inch long. They have six legs in front and two anal spines. They occur also in farmyard manure.

Treatment.—Where these insects are abundant, they can be caught by placing a newly flayed sheep-skin on the ground. The insects will collect under this and the skin can be put into boiling water to kill the creatures.

Beet Fly (*Pegomyia betæ*).—Beetroots and mangolds are often attacked by the larvæ of this fly, which is very like the Onion Fly, which see. The maggots burrow into the leaves and blister them, doing endless harm. The fly appears from late March to June, and sometimes on into late July. The female lays small snowy-white eggs which are placed two to six, side by side under the leaves, but usually in groups of four. The eggs hatch in from five to ten days and the footless maggots at once enter the leaves. When mature the larvæ are about one-third of an inch in length, and then fall to the ground to pupate. Another brood of flies will appear, and possibly a third, until the autumn when they pupate for winter in the soil.

Prevention and Treatment.—Crush all blisters seen early in the season, and deeply trench all infected soil. Give rich and stimulating manures to beet growing on infected ground. In gardens and allotments the attacked plants may be sprayed with nicotine wash to kill the maggots. Where an attack is always expected sow the seed several weeks later than usual.

Big Bud (*Eriophyes ribis*).—This disease, common in black currants, is caused by a minute elongated mite only just visible with a pocket lens. Numbers get into a bud and reproduce, causing it to swell up very abnormally. As the buds die the mites migrate to others, and are carried from bush to bush and garden to garden by the wind, birds, winged insects, or even by the gardener's clothes, and by means of baskets into which fruit is picked. The mites can be found all the year round; breedings and migration, however, take place mainly in the autumn and spring, though eggs may also be found throughout the winter. Normal buds may contain a few mites and so escape detection. Red currants may also be affected. Some varieties such as *Baldwins* and *Black Naples* are more affected than others, such as *Boskoops Giant*, and the French; none, however, are immune.

Prevention and Treatment.—Hand pick and burn all swollen buds. If only a few occur pick off the bud above and the one below the swollen one. If a bush is badly attacked and ceases to bear a paying crop, grub up and burn it. Treat soil where bushes have been taken up with naphthalene or any strong soil fumigant, but replant if possible in fresh ground. Never plant cuttings unless they have been soaked in water for a couple of days before planting. Spraying, unless done a great number of times, does not succeed, and more will be spent than gained.

Brown Scales (*Lecanium*).—Soft brown fat scales or *Coccidæ*, belonging to the genus *Lecanium*, often do much harm to currants, gooseberries, peaches, plums, and plants in general under glass. The GOOSEBERRY SCALE (*L. persicae ribis*) and the PEACH SCALE (*L. persicae*) are very alike. The dead adult skin with ova beneath is oval, brown, convex, and notched behind, and about a quarter of an inch in length. Eggs occur beneath this, as a fine yellowish dust; they hatch in autumn into small oval, flattish, and pale reddish or slaty larvæ, commencing to grow in the spring into the mature scale insect. They attack both the wood and the leaves.

TREATMENT.—Spray in the winter with lime sulphur wash.

Brown Tail Moth (*Euproctis chrysorrhoea*).—This is a snow-white moth with a faint black spot on the front wings. The apex of its body has a rich deep golden-brown tuft of hairs and is very thick in the female; the wing expanse being one and a quarter to one and three-quarter inches. It occurs in August and September, and lays eggs in masses on the leaves covered with hairs from the tail. The caterpillars hibernate in colonies in small winter silken nests. In the spring they form colonies which live in larger silken nests. When mature they are deep brown with red-brown hairs; they have white spots on each side, a narrow broken double red line down the back, and two red tubercles on the eleventh and twelfth segments. They spin up cocoons amongst the foliage, and pupate late in June and July. The larval hairs are barbed and produce a rash. It attacks fruit, roses, hawthorn, sea-buckthorn, and some forest trees.

TREATMENT.—Cut off all winter tents and burn. Spray in summer with arsenate of lead. The presence of this insect must be notified to the Board of Agriculture, Whitehall, London, S.W. 1, unless the gardener desires to be fined £10.

Bulb Mite (*Rhizoglyphus echinopus*).—This is a very common small milky-white or yellowish-white mite, tinged with rusty red; it has four pairs of red legs and a red rostrum, the first two pairs of legs being the longest, and is only just visible to the naked eye. It feeds on bulbs of hyacinths, narcissi, tulips, onions, eucharis, and other lilies; also the tubers of dahlias and potatoes. It may do much damage to bulbs, in checking growth, when the leaves turn yellow, and no flowers result, or, worse still, the bulbs may rot from its attack. The young have six legs and are hatched on and in the bulbs.

TREATMENT.—Soak all bulbs likely to be affected in water at 125° F., for a few minutes, first dissolving some soft soap in the water. Another useful method is to wash the bulb in potassium sulphide, putting about 1 oz. of the chemical into a gallon of water.

Cabbage Leaf and Stalk Miner (*Phytomyza flavicornis*). — Cabbage and other Brassicæ may have the petroles and leaf stalks mined by footless larvæ; these are of a small fly called *Phytomyza flavicornis*, which is about a tenth of an inch long. When mature the maggots eat their way out of the leaf-stalks, etc., and pupate as small brown pupæ in the soil. The fly is dusky black. Attacked leaves turn prematurely yellow and die, and the premature bursting of the heads of spring cabbage is attributed in some cases to this insect. No treatment is known.

Cabbage Moth (*Mamestra brassicæ*).—This is a moth with wing expanse of one and three-quarter inches, which is of a dark grey-brown colour and varied with dark and lighter marks on the front wings. It occurs from May into late June. The caterpillars attack many plants outside the cabbage tribe, especially tomatoes under glass; they foul the plants as well as doing damage by actually eating them. They vary in colour but are usually brown, smoky brown, or greenish-brown, and are paler beneath. When full grown they are one and a quarter inches long; and if disturbed roll themselves up. They change to a shiny brown naked pupa in the soil.

TREATMENT. — Spray attacked cabbage plants with 2 oz. of salt to a gallon of water, or dust with Belumnite. Trap the moths in glass-houses with sweetened fluids in jars, and spray young tomatoes with arsenate of lead.

Cabbage Root Fly (*Phorbia brassicæ*).—All kinds of Brassicæ, especially cabbages and cauliflowers, are often ruined by the maggots of this fly, which resembles the House Fly. These maggots tunnel into the stems, checking the growth considerably, and large plants may be so weakened that the wind blows them over. When badly attacked the plants wilt, and look sickly or fall over. The grubs are footless, and very like those of the ONION FLY, which see. They turn to brown pupæ in the soil and in the stalks. Several broods occur during the year.

PREVENTION AND TREATMENT.—Either dibble in the young plants with soot and old lime or ashes, or protect them with felt discs that can be obtained from any horticultural sundriesmen. The soil should be firm and level so that the tarred discs can be put down flat. Watering with a solution of hellebore (1 oz. of hellebore per gallon of water) is another way of combating this pest.

Cabbage White Butterflies (*Pieridæ*).—There are three species of these which attack all Brassicæ, the LARGE WHITE BUTTERFLY (*P. brassicæ*), the SMALL WHITE BUTTERFLY (*P. rapæ*), and the GREEN VEINED WHITE BUTTERFLY (*P. napi*). Most damage is done by the first named, whose wing expanse is often two and three-quarter inches. The female lays her yellow eggs in clusters on the leaves. The caterpillars, which are too well known to need description, are more or less gregarious, and eat the leaves often to mere skeletons. They mature in a month and then become chrysalids, these being often seen on the walls of outhouses, palings, trees, etc.

PREVENTION AND TREATMENT.—Collect all egg masses and young broods of larvæ. Destroy all wintering chrysalids. Spray or water attacked plants with weak salt and water, or dust with Belumnite.

Cabbage White Fly (*Aleyrodes proletella*).—Several species of so-called "White Flies" or "Snow Flies" exist—one is found harmful to Brassicæ, another (*A. vapariorum*) is under glass to Tomatoes especially. These small mealy snow-white insects are related to Scale Insects and Aphides. They live by suction; both the body and wings are covered with a fine white meal. They place their eggs singly on or under the leaves, sometimes covering them with white powder. The eggs, which hatch in a few days, give rise to larvæ covered by a transparent scale of small size. Later they become an opaque white with two yellow spots, and in eight to twenty days turn to pupæ under the "scale," hatching out four to ten days later. Many broods occur in the year. They produce brown and yellow patches on the leaves. The one in cucumber and tomato houses works similarly to the Cabbage species.

PREVENTION AND TREATMENT.—Destroy all outside leaves and stalks of Brassicæ. If the attack is severe spray with soft soap solution, putting ½ lb. into 5 gallons of water. Attacks under glass may be controlled by fumigating with tobacco preparations, two or three times at intervals of a fortnight, or with hydrocyanic acid gas.

Carnation Maggot (*Hylemyia nigrescens*).—This is very similar to the BEET FLY, which see. It lays its eggs on carnations, and the footless maggots coming from them eat into the leaf, and down to the centre of the shoot, where they tunnel into the pith and so kill the plant. At first they burrow into the leaves, making pale lines or more or less sinuous tunnels. They pupate in the plants, and also the soil. Young plants, especially layers, suffer most.

TREATMENT.—There is no means of prevention, but all attacked plants should be pulled up and burnt. If a shoot is flagging pull out the point, and if maggots occur they can be seen by cutting a slit down the shoot.

Carnivorous Slugs (*Testacellæ*).—Certain fat yellowish slugs may be found in the soil which have a small *external* shell, and are often regarded as pests. As these feed upon other slugs and insects, however, as well as earthworms, they should be protected.

Carrot Fly (*Psila rosæ*).—The maggots of this fly cause the "rust" in carrots, which is a common disease. The fly is less than half an inch across the expanded wings; it is shiny, and of a metallic blackish-green colour, with a large yellow head, black eyes, and yellow legs. It appears when the carrots are young, and lays its eggs on them, penetrating into the soil. Grubs may be found in the roots between the end of May and on to the time the carrots are lifted, several broods occurring each season. When mature the maggots change to sausage-shaped brown pupæ in the carrots or soil. The late broods all pupate in the soil of the carrot beds. Some few, however, may be lifted with the carrots and pupate in the store house.

PREVENTION AND TREATMENT.—Double dig or trench the infected land after an attack. Spread a mixture of ash or sand and paraffin oil (1 pint of oil to a bushel) over the young plants after thinning, and later apply soot freely. Burn all diseased carrots at once; to leave them rotting on the ground is a certain means of encouraging the pest.

Cattleya Fly (*Isosoma orchidearum*).—This is a small Hymenopterous insect belonging to the *Chalcididæ*, most of which are parasites of other insects. The fly is a fifth of an inch long; it is black, and has four transparent wings. Its larvæ attack the pseudo-bulbs and the other parts of Orchids, causing the invaded areas to swell up and turn black. They are white and footless, pupating in the galls, after which the small flies eat their way out, leaving tiny round holes. Small orange footless maggots also attack the plants; these are the larvæ of a small fly called *Cecidomyia cattleyæ*.

TREATMENT.—All galled growth should be carefully cut away, or the galls cut open and the maggots destroyed. Badly attacked houses should be frequently fumigated with tobacco.

Celery Fly (*Acidia heraclei*).—Celery and celeriac are often quite spoilt by the numerous blisters produced in the leaves by this small fly's maggot, and in some years parsnips are attacked in the same way. When this occurs amateurs often imagine the damage is due to a distinct fly, but the so-called PARSNIP FLY is really the one under notice. The fly is nearly half an inch in wing expanse ; it has mottled wings and bright green eyes. The female lays her eggs on the leaf, and the young maggots burrow into the tissue, where they cause the well-known blister-like scars. When mature they turn to yellow pupæ in the leaves and a few in the soil. The fly lays its eggs in the young plants, especially before being set out from April to June. Several generations occur, maggots being found in the leaves as late as December.

PREVENTION AND TREATMENT.—See that the seedlings are protected by muslin screens on bright days so as to prevent them being attacked. Never plant out any showing even small blisters. Crush all the first blisters that occur, and so prevent subsequent broods. Dry spray the rows in June with Belumnite, or spray with nicotine and soap (½ oz. nicotine, 2 oz. soap, and 10 gallons of water), as soon as the blisters are noticed. Deeply trench all land where celery has been grown, and keep the rows freely fed and watered in dry weather.

Celery Stem Fly (*Piophila apii*)—This fly has been little known since 1848, and is not important. So little is known about it that no treatment can be advised, beyond that of keeping the plants healthy by frequent watering and feeding.

Centipedes. — Although many people regard these as harmful pests, since they are related to the MILLEPEDE (which see), they are beneficial and should not be destroyed. They can be distinguished from the latter as they have only one pair of legs on each segment. There are several kinds, one of the commonest being *Geophilus longicornis*. Their antennæ are long, and this also enables us to distinguish them from the Millepedes, many of which are exceedingly harmful.

Chafers (*Melolonthidæ*). — These are large, fat, dirty, white grubs, swollen at their ends, often found attacking garden plants, vine roots, etc. Chafer grubs have a large head, six jointed legs in front, and are very sluggish ; they feed upon the roots of all manner of plants and even trees. The two most abundant are the JUNE BUG or SMALL COCKCHAFER (*Rhizotrogus solstitialis*), and the MAY BUG or LARGE COCKCHAFER (*Melolontha vulgaris*). The first is about two-thirds of an inch long and is pale brownish. It has four raised ribs on each wing case. The latter is an inch long, and has a black thorax, reddish-brown wing-cases, with four raised lines on each side, and at the sides of the body five white spots separated by black ; the abdomen in both passes beyond the wing-cases, and in the female ends in a downwardly bent horny egg-tube. The LARGE CHAFER GRUB is one and a half inches long : it takes three to four years to mature, but the JUNE BUG MAGGOT lives only one year in the soil. The beetles collect in numbers on isolated trees, around which they may be seen flying in masses in the evening.

PREVENTION AND TREATMENT.—The grubs may be destroyed by digging in naphthalene or patent soil fumigants, the former at the rate of 2 cwt. to the acre. Many may be trapped in vine borders, etc., by placing a turf upside down in the soil, and examining this at frequent intervals. The beetles may also be jarred off the trees in day-time and crushed or given to pigs.

Click Beetles. See under WIREWORMS.

Cockchafer Grubs. See CHAFERS.

Codling Moth (*Carpocapsa pomonella*).—This is a small moth three-quarters of an inch long, with dark grey and grey fore-wings, on which are darker wavy lines and a metallic patch at each corner, the hind-wings being a dark slaty-grey. It occurs in the orchard and garden at dusk, about or soon after the falling of the apple and pear blossom. It lays its minute flat eggs on the young apples or pears, and the maggots or larvæ coming from them enter the fruitlets by the "eye" and tunnel into them, and eventually escape by another opening at the sides, top, or base. The maggots are a dirty white to a dull pinkish colour, and are about half an inch long. They have six true legs, four pairs of sucker feet, and anal pro-legs. They fall with or from the apples, and crawl back up the trees to pupate under the bark, moss, lichen, and bands. They remain as larvæ as a rule till the spring and then pupate, but now and then do so at once, and a second brood then attacks the late apples.

PREVENTION AND TREATMENT.—Band standard and half-standard trees with sacking in spring and leave this on till the autumn or winter. Then the ascending larvæ will pupate beneath and can at leisure be killed. Spray cordons and bush trees with arsenate of lead within ten days of the falling of the blossom. Employ poultry in the attacked orchard, and turn pigs in when the fruit is falling.

Colorado Beetle (*Doryphora decemlineata*).—This is an American beetle which is very harmful to potatoes. It has occurred once in this country, and its presence must be notified to the Board of Agriculture and Fisheries at Whitehall. The beetle is a little less than half an inch long; its colour is yellow, and it has five long dark lines on each wing-case, and dark marks on the thorax, the wings themselves being a marked rosy hue. It hibernates under the soil and under rubbish, from a few inches to 2 ft. in depth, and lays yellow oval eggs on the potato and other plants, the larvæ feeding on the foliage. The young are dull reddish-brown, and bear some resemblance to Ladybird larvæ; later they vary from orange to brick-red marked with rows of black spots. They pupate in the soil.

PREVENTION AND TREATMENT.—This insect is dealt with officially by the Board of Agriculture. In America affected plants are sprayed with Paris green or arsenate of lead.

Crucifer Midge (*Cecidomyia brassicæ*).—This is a small two-winged "gall-fly," with black head and thorax. It has a pinkish abdomen banded with dark brown, and black legs silvery beneath. It lays its eggs in young cruciferous seedpods in which small white footless maggots are found in May and June. These fall to the ground to pupate from the split pods, and a second brood of flies occurs a few days later.

TREATMENT.—Where the seed heads are badly attacked it is best to give seed production up and burn the lot; there is no remedy, but the central shoot may be pinched off so that others grow: these will be free from maggots.

Cuckoo Spit (*Philaenus spumaria*).—The Cuckoo Spit on roses, other plants, and even on apple trees, is too well known to need description. It is caused by an insect known as the FROG HOPPER, which is related to the CAPSID BUGS—creatures which live by sucking out the sap of plants. It lays its eggs in the plant, and the young wingless larvæ feed by sucking the sap and cover themselves with a frothy mass, under which they change to nymphæ, and from this stage in the early autumn the winged and jumping Frog Hoppers appear. Rambler roses are particularly liable to attack, and so are chrysanthemums. The pests stunt all growth above them.

TREATMENT. — Spray forcefully with nicotine and soap, or pyridine and soap solution.

Currant and Gooseberry Sawflies (*Nematus ribesii*).—Both currants and gooseberries are often defoliated by so-called FALSE CATERPILLARS, which are the larvæ of a Sawfly. These larvæ range in colour from bluish-green to green; they are spotted with black, marked with yellow and blue at the sides, the first and last but one segment of the body being yellow. When full grown they reach half an inch in length, and then become pale green, except for the yellow behind the head and on the tail. The adult Sawfly is about half an inch in wing expanse, and has four transparent wings. The female has an orange body, the male a dark one; and the thorax of both is black and yellow. The Sawflies appear in April, and the females lay their eggs along the veins under the leaves. The eggs hatch in five to seven days, and the young larvæ feed together, eating out the well-known small round holes in the leaves. Later they pass out over the foliage, and often completely destroy it. In four or five weeks the larvæ reach three-quarters of an inch in length and fall to the ground to pupate in earthen cocoons, the pupæ hatching out in two to three weeks. The winter is passed in the soil under the bushes. The Sawfly larvæ have all more than four pairs of pro-legs, and so can at once be distinguished from the larvæ of any butterfly or moth, which never have more than four pairs of pro-legs.

PREVENTION AND TREATMENT.—Pick off all early attacked leaves, showing the small round holes. Spray with arsenate of lead or blow Belumnite or hellebore over the attacked bushes. If the fruit is to be picked and used green, apply 1 lb. of soft soap to 10 gallons of water as a heavy wash.

Currant Clearwing (*Aegeria tipuliformis*).—This is a small "clear-wing" moth, two-thirds of an inch in wing expanse, the body and thorax of which are purplish-black with yellow bands. It has an expanded tail, and the clear wings have black fringes as well as black veins, also a yellow sheen. It occurs in late May and June, laying its eggs on currants, especially of black variety, and the larvæ tunnel into the shoots, working up and down the stems during the winter. In April they are pale caterpillars less than an inch long, which then pupate in the black tunnel in the shoot or stem.

TREATMENT.—Prune back all stems that are dying until the black tunnel is cut away, and burn with the caterpillars in them.

Diamond Back Moth (*Plutella maculipennis*).—This is a small moth like a Clothes Moth, but the wings are folded roof-shape on the body. The front wings are reddish-brown to slaty-brown, with a pale yellowish white border, and when folded the pale edges meet, and form diamond-shaped areas. The hind wings are slaty-grey with long fringes. It occurs in June and July, laying its eggs under the leaves, the larvæ feeding on cabbage, turnips, and all Cruciferæ. At first these are grey; then they become green, and are half an inch long when mature. They feed under the leaves, and when the leaves are touched they fall by a silken thread and hang in the air. Maturity is reached in four to five weeks, and pupation takes place in a network-like cocoon on the defoliated leaf-stalk, the pupa being black and white. Winter is passed in the pupal stage amongst dead foliage, including that of cruciferous weeds.

TREATMENT.—Spray with arsenate of lead, or draw branches of broom or birch between the rows to knock off the larvæ, and trample them underfoot.

Earwigs (*Forficula auricularia* and *Labia minor*).—Earwigs are of two kinds: those which are common flyers—the SMALL EARWIG (*Labia minor*); and those that do not fly as a rule—the LARGE EARWIG (*Forficula auricularia*). They all have four wings, the first pair being small stumps, beneath which the large membranous wings are complexly folded up. These insects will often feed upon the blossoms of dahlias, violas, and other plants, also upon ripe fruit and hop leaves. They mostly feed by night and hide away during the day under any shelter. The female lays her eggs in little nests in the soil, or under the bark of trees, and the young, which are similar to the parents but white, are attended by the mother for some time. They grow into the adult by moulting their skins, and gradually darkening in colour.

TREATMENT.—Place a pot filled with moss and horse dung, hay, straw, or paper, on a stick where they are working, and the insects will be attracted there during the day, when they can be caught and put into boiling water. Heaps of rubbish (straw, paper, etc.) may be thrown on the ground where they are doing harm and burnt during the day.

Eelworms (*Anguillulidæ*.—These are almost microscopic white eel-like creatures, many of which are parasitic in plant tissues. Some attack roots and stems, such as the EELWORM ROT in peas and beans, etc. (*Tylenchus devastatrix*), or onions, and many flowering plants. Others penetrate into the foliage, such as the FERN-LEAF EELWORM (*Aphelenchus oleisistus*); another produces the CAULIFLOWER DISEASE OF STRAWBERRIES (*Aphelenchus fragariæ*). Others still produce galls, such as KNOT ROOT, which see. They all lay their eggs in plant tissues, and when the plants decay the worms and any unhatched eggs pass to the soil, which may quickly become impregnated with them. They enter the rootlets, etc., by means of a fine boring spine. Attacked plants often show crinkled leaves, and the invaded parts decay more or less rapidly. The wounds caused by the pest also let in various fungi and bacteria.

TREATMENT.—Sterilise all soil used for potting or in smaller beds by heat. Do not grow the same crop two years running if attacked. Dress attacked land with lime, or with one or other of the stronger soil fumigants (see article on *SOIL FUMIGATING*).

Felted Beech Coccus (*Cryptococcus fagi*).—This is a naked scale insect which forms white mildewy-looking wool on the trunk and branches of the beech, and which any time may kill very large trees. The insects breed and grow beneath the felted grey or white mass. They live by sucking out the sap.

TREATMENT.—Scrub the attacked tree, if an ornamental one, with soap and water and a hard brush, or spray with paraffin emulsion or caustic alkali wash in winter.

Flat Body Moths (*Depressaria Spp.*).—Sometimes the larvæ of the so-called Flat Body Moth do harm to carrot plants for seed; they draw the tip of the flower heads together with silk and feed upon the flowers and seeds. They are greenish to yellowish-grey, with black spots and faint streaks along the back, and are half an inch long when mature. They pupate either in the flower heads or bore into the stalks. The moths are three-quarters of an inch in wing expanse; the wings lie flat over the body; the fore-wings are dusky reddish-brown freckled with white and with dark streaks; the hind wings being grey. The head and thorax are reddish-brown and freckled with black. Another larger species attacks parsnips.

Treatment.—Cut off all webbed heads or blow hellebore over the seed heads which are only slightly affected.

Fruit Bark Beetles (*Scolytus rugulosus*, etc.).—These are small beetles about a tenth of an inch long, and of a shiny pitch-black colour, which attack the bark of fruit trees. They bore into the bark, and the females form galleries, and lay eggs there. The small white footless maggots eat away galleries at more or less right angles. Later the larvæ pupate and the adults or beetles escape by numerous small openings which have the appearance of shot holes. The trees are often killed by this pest.

Prevention and Treatment.—Destroy all badly attacked trees in winter, and well manure all neighbouring trees so as to produce a flow of sap and thus kill the larvæ.

Garden Swift Moth (*Hepialus lupulinus*).—This is a very active evening and night-flying moth about an inch in wing expanse. Its colour is brown, and it has white markings on the front wings. The moth lays her eggs late in May and June whilst in flight. The caterpillars, which are a dull white, feed upon the roots of mint and many other plants all the winter, and do great damage. They have typical caterpillar legs, also a brown head, and are very active, wriggling violently whenever exposed. In the spring they change to brown pupæ.

Treatment.—Clear the ground by using naphthalene or other soil fumigants (see article on *Soil Fumigating*).

Goat Moth (*Cossus ligniperda*).—The large caterpillars of this moth tunnel into apple, ash, oak, pear, willow, and other trees, eventually killing them. The moth is large and heavy, the female reaching three and a half inches in wing expanse, while the male's wing expanse is between two and three inches. The body is large and hairy, and when the wings are expanded reaches much below them. The fore-wings are dark grey and brown, with dusky transverse streaks, the hind-wings being grey to greyish-brown with small darker markings. The moths occur in June and July, the female laying her eggs on the trees. The caterpillars when full-grown are three to three and a half inches long, and are deep dull ochre-yellow, with a broad stripe of a rich mahogany-red down the back. They feed in the trees for three years and then change to brown pupæ in cocoons of wood chips, pupation taking place in May.

Treatment.—When trees worth saving are attacked, insert a piece of stick cyanide in the holes and close with clay. Burn all dead timber attacked by the moth as soon as cut down.

Gooseberry Sawfly. See Currant and Gooseberry Sawflies.

Green Fly. See Rose Aphides.

Heart and Dart Moth. See under Surface Larvæ.

Knot Root (*Heterodera radicicola*).—This well-known disease in cucumbers, melons, and tomatoes is due to minute Eelworms—microscopic creatures which invade the roots and cause them to swell up into fantastic growths, when death soon follows. The male worm is cylindrical, but the female is citron shaped.

Treatment.—Sterilise all soil used in the houses by heating it up to 200° F. Destroy all galled roots by complete burning (not charring). Use strong soil fumigants (see article on *Soil Fumigating*), which will do a certain amount of good.

Lackey Moth (*Clissiocampa neustria*).—The caterpillars of this moth live in colonies under and on silken tents on fruit and other trees and in hedges; they are often a foot long. Large plantations of fruit trees are often completely defoliated by them. The caterpillars when mature are one and a quarter inches long; they are lined with brilliant colours on a dark and blue ground and have rusty hairs. The heavy bodied moths are shades of reddish and yellowish-brown, with a pale line or lines across each fore-wing. They occur and lay their eggs in September in rings, without any hair, on the current year's growth of wood, the eggs hatching in May and June. When mature the caterpillars spin cocoons of silk amongst the foliage, etc., in August.

Prevention and Treatment.—Destroy all "nests," either by cutting down with long handled shears or even shooting down with a gun. Spray with arsenate of lead where the nests cannot be removed. See that all egg-rings are destroyed when pruning.

Larch Aphis (*Chermes abietis-laricis*, etc.).—The white fluffy growth seen on larch needles is due to several species of Aphis. One species migrates to the spruce, where it forms pine-apple-shaped galls.

Treatment.—Spray the spruce in the winter with paraffin emulsion, and if any special larch trees are attacked spray them also.

Larch Sawfly (*Nematus erichsoni*).—This is a sawfly the larvæ of which do considerable harm to the larch trees in the north of England. It is nearly an inch long, and has a wing expanse of a little less than an inch. Part of the abdomen is red, black, or tawny at apex, though the general colour is black; the wings are glassy and are slightly clouded below the stigma. The flies lay small white eggs at the base of young larch leaves, and the caterpillars devour the foliage during the summer, especially in July and August, and leave the trees at the end of the latter month. The larva when full grown measures three-quarters of an inch long; it is grey-green above, and paler at the sides, while underneath it is yellowish-green. The larvæ have twenty legs, and when fully fed leave the trees and pass on to moss and litter, or down to the soil below, there spinning cocoons in which they pass the winter. In the spring or summer they pupate, and the Sawflies soon hatch out. Larch trees are liable to attacks until they are seventy years old.

Prevention and Treatment.—Kill all clustered larvæ by hand, or jar them off the trees and trample underfoot. Spray the trees with arsenate of lead, burning litter in the winter below attacked trees.

Leather Jackets (*Tipulidæ*).—The Daddy Long-Legs or Crane Flies that we see too often are the parents of larvæ that do so much damage in the soil, called "Leather Jackets." These grubs when mature are slightly over an inch long, and about as thick as a goose quill. They have a wrinkled, brownish, rather tough skin, a well-marked head, which can be retracted into the body, a blunt tail-end with short finger-like processes around it and no legs. They feed on the roots of nearly all plants, and may be found all the year round just under the soil surface. The Daddy Long-Legs itself needs no description for it is obviously well known. When mature, the Leather Jackets change to brown chrysalids, which can be told by two horns in front and many backwardly projecting spines on the body. When the time comes for the flies to hatch, the pupæ by means of the spines push their way out of the soil; the Crane Flies emerge and are soon ready to lay eggs.

PREVENTION AND TREATMENT.—Leather Jackets, unlike Wireworms, can be easily killed by digging in naphthalene at the rate of 2 cwt. to the acre. Gaslime is valuable and should be used when obtainable. Various other soil fumigants, indeed most of those referred to in our article on *SOIL FUMIGATING*, will destroy them, and many of the grubs may be caught in gardens by placing turf upside down on infected land, after which the attracted larvæ are destroyed by hand.

Lettuce Root Aphis (*Pemphigus bursaria*).—A white fluffy material is often seen on the roots of old and late sown lettuce plants. This is due to the POPLAR GALL APHIS, (*P. bursaria*), a migration taking place annually between poplars and lettuce.

TREATMENT.—Dig in naphthalene and destroy at once all attacked roots. Never leave them in the soil, as is so commonly done.

Little Ermine Moths (*Hyponomeutidæ*).—These are small moths with satiny-white or leaden grey fore-wings on which are numerous small black dots; and with darker hind-wings, and longish fringes. Their caterpillars live in colonies under tents of silk, where they spin their cocoons. Winter is passed as eggs or newly hatched larvæ under a small resinous covering on the young wood. One species attacks apple, hawthorn, and pear trees, another Euonymus.

PREVENTION AND TREATMENT.—Cut off all nests and burn. Spray with arsenate of lead in the summer, and with caustic alkali wash in winter, to destroy egg-covers.

Magpie Moth (*Abraxas grossulariata*).—This is a moth with a two-inch wing expanse which is creamy-white and spotted or banded with black and yellow. It occurs in July and August, when the female lays yellow oblong eggs on the leaves. Little pepper-and-salt caterpillars come forth very soon and feed until the late autumn; then they hibernate amongst dead leaves, etc., and commence to feed again in spring. By June they are full grown and reach one and a quarter inches in length, when it will be noticed they are black spotted on a white ground, with orange marking at the sides. The pupa is black, banded with orange, and occurs in a loose cocoon of silk amongst the leaves.

TREATMENT.—Spray in the early spring with arsenate of lead and destroy all winter shelter, such as dead leaves, etc.

Marguerite Fly (*Phytomyza affinis*).—This is a small fly similar to a small House Fly. It is dark in colour, about a tenth of an inch long, and occurs in May and June, when it lays its eggs in the leaves of chrysanthemums. The footless maggots bore a narrow tunnel which appears pale in the tissue of the leaf, and these change to seed like brown puparia. Several broods are possible each season.

TREATMENT. — Spray frequently with nicotine and soap wash.

Mealy Bugs (*Dactylopius longispinus*, etc.).—These are naked scale insects which attack vines and many hothouse plants. The females are apterous, and covered with white meal and cottony matter, the minute males being pale red and winged. The females lay a mass of eggs covered with cottony material, and these produce the spawn or larvæ which wander about.

TREATMENT. — Paint affected parts with methylated spirit, or nicotine and soap. Fumigate with hydrocyanic acid gas in vineries from time to time.

Mealy Plum Aphis (*Hyalopterus pruni*).—This is an Aphis which migrates between plums, etc., and rushes and reeds. It collects in dense masses under plum and apricot leaves, producing a quantity of honey-dew that falls on and ruins the fruit in the case of the plum. There is no leaf curling, as in the ordinary green PLUM APHIS (*A. pruni*), on which separate notes are given.

TREATMENT.—Spray with paraffin jelly plus 1 lb. of liver of sulphur to every 100 gallons of wash.

Millepedes (*Julidæ*).—These are included with centipedes in a group called *Myriapoda*. Unlike Centipedes, which are garden friends, Millepedes may do much damage. They are elongated and active and have two pairs of legs on all the rings of the body, except for the first three, which have each one pair. Some of them, such as the SMALL SNAKE MILLEPEDE (*Blanjulus guttulatus*), are very harmful to roots of many plants and to tubers. This Millepede is about half an inch long, wirelike and about as thick as a pin. It is of pale dull pinkish colour and has a double row of pink or purple spots down the back. All Millepedes can coil themselves up like an Ammonite, and spend their winter in the soil, the females laying their eggs on the ground. The larger dark kinds mainly feed on decaying vegetation, and thus are not serious garden pests.

PREVENTION AND TREATMENT.—Dress badly infected soil with naphthalene or other soil fumigants (see article on *SOIL FUMIGATING*), and trap by placing in the soil decaying turnips or potatoes, taking these up a few days later and burning them up.

Mole Cricket (*Gryllotalpa vulgaris*). — In glass-houses this pest is sometimes very harmful, and also it is a nuisance out of doors. It feeds upon the roots of all manner of plants, and even upon grass. The adults are nearly a couple of inches long; they are of a brown colour, with curious broadened anterior legs and two tails. Tunnels are made by them in the soil, the females making their egg nests sometimes as deep as 10 ins. below the surface. One female will lay over three hundred eggs. The young are like the adults in form, and to some extent resemble ants, but they do not move so rapidly. Their habits are chiefly nocturnal, and it is at night that they come forth and eat the plants, but even by day they devour roots.

TREATMENT.—Pots baited with meat may be sunk in affected borders, level with the soil. If their burrows can be traced they may be destroyed by pouring in boiling water, or by burying naphthalene. When much ground is infected carbon bisulphide injections will be necessary, or other strong soil fumigants will need to be used. (See article on *SOIL FUMIGATING.*)

Mushroom Pests.—Numerous insect and allied pests attack cultivated and wild Mushrooms, including WOODLICE (see later); maggots, the larvæ of Midges (*Sciara Sp.*), also ROVE BEETLES (*Quedrus*). DUNG BEETLES (*Aphodius Spp.*) and SPRINGTAILS (*Aptera*) likewise do some harm.

TREATMENT.—Spray the walls, etc., before setting spawn with 2½ per cent. Lysol, and spray the beds themselves before any growth takes place.

Mussel Scale (*Lepidosaphaes ulmi*).—This is a small brown scale, often less than an eighth of an inch long, which is found on the bark, leaves, and fruit of apples, pears, etc. In the winter the scales have eggs under them, which eggs hatch in mid-June into little six-legged larvæ, looking like specks of lime. Later these settle down, plunging their proboscis into the plant tissue, and lose their legs, etc., as they become covered with the scale, which has been secreted by the insect.

TREATMENT.—Spray with caustic soda wash or lime sulphur wash in winter, and paraffin emulsion at the end of June.

Narcissus Bulb Fly (*Merodon equestris*).—This is a fly of very varied colour, which is hairy and much like a small bumble bee, but much more active, as on sunny days it darts about from place to place. It lays its eggs on various kind of daffodils, narcissi, and lilies. The maggots coming from the eggs enter the bulbs when the leaves are dying off and destroy them. They may pupate in the ruined bulb or in the soil, and this takes place in the early spring. Much damage is caused by the fly, which is notifiable to the Board of Agriculture.

PREVENTION.—Never plant any bulbs feeling soft, and in any case soak all bulbs in water for ten days before planting if the maggot is suspected. Flies cannot be dealt with except by catching with a butterfly net. Various baits have been tried, but none seem to be of any value for enticing the insects.

Nut Weevil (*Balaninus nucus*).—This pest is a tawny to chocolate-brown weevil with golden-brown pubescence and a long, curved snout. It is about one-third of an inch long, and lays eggs in the young cob, filbert, and hazel nuts, causing the well-known maggot—a sluggish, white, footless creature, with a brown head. This grub eats out the nut and escapes from the shell by tunnelling a round hole. It then falls to the ground, where, in the soil, it pupates, and comes up in the early summer as the Nut Weevil.

PREVENTION.—Keep a look out for the weevils, and jar them off on to tarred sacks. Spray with arsenate of lead, and treat soil in the winter with strong soil fumigants.

Onion Fly or Maggot (*Phorbia cepetorum*).—The Onion Fly which produces the "Maggot" in onions is very similar to the House Fly. It lays its eggs on young onions close to the ground in the spring. These give rise to dull, dirty-white, footless maggots, which at first feed freely in the soil on the young onions. Later they become brown puparia in the soil—the chrysalis stage—and in a short time another brood of flies appear. These again lay eggs, and the maggots from them eat into the onions, causing the leaves to wilt and turn yellow, and then the onions rot with a characteristic smell. Winter is passed in the soil as brown puparia, and some of the maggots may be harvested with the crop, these, of course, hatching out in the storeroom.

Prevention and Treatment.—Sow the seed under glass, and transplant in spring or use seedling bulbs. Dress young onions in the spring when attacked with a light sprinkling of washing soda, and also use old soot very freely. Pick out and destroy all attacked plants. Sprinkling with paraffin and sand at times does good.

Orchid Borer (*Xyleborus morigerus*).—This small beetle lays its eggs in the aerial roots and stems of orchids. It bores its way in, and the footless white maggots, hatching from the eggs, soon form long tunnels. Their presence can be detected by small round holes the size of No. 16 shot, and the wilting of the part attacked. Dendrobiums are especially liable to attack. The beetle is about a twenty-fifth of an inch long; it is brown and stumpy in form.

Treatment.—Cut away all parts showing the round holes, tunnels, etc., inside, and burn them.

Otiorhynchus Weevils (*Otiorhynchus picipes*, etc.). — These weevils are characterised by having no wings, the elytra being firm together. The chief are the Clay-Coloured Weevil (*O. picipes*), the Vine Weevil (*O. sulcatus*), and the Plum Weevil (*O. tenebricosus*). They are large beetles one-third to half an inch in length, with a blunt, short rostrum, also marked elbowed feelers near the end. *O. picipes* is tesselated with paler shades, *O. sulcatus* is dark, and *O. tenebricosus* is black and has reddish legs. The beetles feed upon the leaves, buds, and wood of fruit trees, vines, etc., laying their eggs in the ground; the curved, footless maggots, with wrinkled skin, devouring the roots of all manner of plants, especially strawberries and pot plants. They occur as larvæ and adults during the winter. The beetles are very timid, falling at the least shock or sign of light, and as they feed at night may be trapped.

Prevention and Treatment.—Spray attacked fruit trees with arsenate of lead. Band young grafted or young stock with Tanglefoot to prevent bud-eating. In foliage attacks jar the weevils on to tarred sacks in the case of bad attacks.

Oyster Shell Bark Scale (*Aspidiotus ostraeeformis*).—This is a more or less scurfy, grey, round, scale insect attacking various fruit trees, which may reach a twelfth of an inch in diameter. Masses of them get mingled up and deformed, producing a dirty-grey, scurvy coating, especially on the bark of plum trees.

Treatment.—Smear thick clay and lime over the attacked trunks, and spray with lime sulphur wash for the upper parts in the winter.

Pea and Bean Seed Beetles (*Bruchidæ*).—Peas and beans are often badly damaged by the maggots of several kinds of beetles, related to weevils, which are mostly small, broad-bodied creatures, seldom more than a sixth of an inch long. In colour they are various shades of brown, with grey or rusty markings. The female lays her eggs in the developing pea or bean pod. The maggot lives inside the pea or bean, pupates there, and remains in the seed unnoticed all the winter. Infected seeds can be told by the small round depressions on the sides, where the maggot comes to the surface to pupate. When the beetle hatches, it eats its way out, leaving behind a round exit hole.

Prevention.—Never sow infected seed unless the seed has been soaked in 1 per cent. carbolic water for some days, or has been fumigated with carbon bisulphide.

Pea and Bean Weevils (*Sitones*).—Too frequently loss occurs amongst early and mid-crop peas owing to damage by these small weevils, which eat out the leaves in more or less regular notches at the sides, and too often kill the whole plants. The weevils are small beetles only a fifth of an inch long which are greyish to clay-coloured, and have three pale stripes on the thorax and stripes on the wing cases. They lay their eggs in the ground, the maggots feeding on roots of peas and beans, and then pupate in the soil. Later they hatch, and the beetles attack the late sown peas, continuing to live until next year. Only one species appears to be epidemic on peas and beans. The clover species are now known to be distinct from this pea and bean pest. These small beetles are very timid, falling at the least shock, and hence are not seen unless looked for carefully. They are earth-coloured beneath, and hence too often escape notice. In dull, cold weather they lie quiet under stones, clods of earth, etc., to protect themselves.

PREVENTION AND TREATMENT.—If the soil is fine the pests can find no protection, so start with a fine tilth. If the soil is rough, spread fine soil from glass-houses over the attacked rows. If not, a heavy dressing of soot and road dust will be equally effective, especially if a little paraffin is added.

Pear Leaf Blister Mite (*Eriophyes pyri*).—This is a small mite which enters the pear leaves and causes first pale then black spots, and then dying leaves. It is somewhat similar to the BIG BUD of currants, which see. It may also attack young fruit of both apples and pears and ruin it. Although it spreads slowly, it may do much harm. It winters in the buds under the scales.

TREATMENT.—Spray in the winter with lime sulphur wash, and in the spring with paraffin emulsion.

Pear Leaf Blister Moth (*Cemiostoma scitella*).—This is a small moth a quarter of an inch long, and of leaden-grey colour; it has a darker streak along the front wings, also a coppery band and black spot with violet pupil and darker lines at the apices, its hind wings being leaden-grey. The larvæ eat out round patches (blisters) in apple and pear leaves, which look like dark spots, and when mature leave the blisters and spin up in crevices in the bark and in the soil.

TREATMENT.—Hand pick the first attacked leaves and spray with arsenate of lead.

Pear Midge (*Diplosis pyrivora*).—One of the most disappointing things regarding pears is to find young fruitlets growing away rapidly then failing. If they are cut open one finds them full of small white maggots. These are larval Pear Midges—the young of a small, two-winged black fly, which by means of her long egg-laying tube places her eggs deep in an unopened blossom. When full grown the maggots escape from the galled pearlet and pupate in the soil, hatching out in the following year about the time the pear blossom commences to show.

PREVENTION.—All that can be done is to pick off all swollen, galled fruitlets and burn them, and to keep hens and chickens under attacked trees or in orchards.

Pine Beetle (*Hylurgus piniperda*).—This is a small beetle one-fifth of an inch long and somewhat dark in colour. It is often very harmful to the young shoots of Scots Pine. The beetles hibernate in the rough bark and burrow into it. They then eat out exit holes, surrounded by a ring of hard resin. Some hibernate in the shoots, which fall with the insects in the autumn. They commence to breed in early March or April. The female lays her eggs both in healthy and sickly trees, and in those felled during the previous year. The larval tunnels, which arise from the mother gallery made by the female and are often 3 ins. long, are at first threadlike, and then gradually widen out, at more or less right angles to the mother gallery. These galleries are made in the bark and not the wood. The beetles escape from holes eaten through the bark—the so-called "flight holes." Those from the second brood, and late swarmers from the old burrows, bore into the young leading shoots, enter the pith, and kill the shoots, which fall to the ground in the autumn, and often cover the soil in pine woods.

Treatment. — Destroy breeding places in the stems of cut trees or unhealthy ones. Keep woods free from all brushwood and remove dead trees at once.

Pine Weevil (*Hylobius abietis*).—This is a dull black weevil, with pale yellowish spots on the wing-cases forming irregular bars. It also has some yellow spots on the thorax, a stout rostrum with elbowed feelers at the end, and varies from one-third to half an inch in length. It is injurious in the perfect state alone, and eats the needles and shoots of young and even old conifers, but especially those four to seven years old. The bark is eaten as if by rabbits. The pest, which may be found in all stages during the season, may even live two years in the beetle stage, and continue egg laying. A single generation takes fifteen months to complete. The weevils appear in "swarms" during April, the eggs being laid on the roots of trees felled a year or so previously, and on stumps, where winding galleries are made.

Treatment.—Destroy all stumps and roots when felling. Place pieces of fresh bark on the ground, the outer bark upwards, to catch the beetles. Collect and destroy beetles by jarring-off on to tarred matting. Make trenches to prevent beetles from reaching a newly felled or newly planted area.

Pith Moth (*Blastodaena vinolentella*).—This pest is a small moth whose larva penetrates into the shoots of apple, pear, and probably also hawthorn, causing the death of the shoots. The larva winters at the base of a bud forming a brown blister like a "Canker" scar, but has a round hole in it. In the spring the small caterpillar eats up the growing shoot as the side bud grows out, and kills it.

Treatment. — Only bush trees seem to be attacked and locally; all flagging shoots should be taken off. During winter pruning see that all blistered areas are cut away and burnt.

Plum Aphis (*Aphis pruni*).—This is a small green Aphis which curls up plum leaves, and often causes them to fall. It winters in the egg stage on plums, laying small shiny black eggs near the buds in the late autumn.

Treatment.—Spray with lime and salt wash just before the blossom buds open.

Plum Red Grub (*Opadia funebrana*).—This is a small chestnut-red larva which feeds inside ripening plums and damsons, with typical pro-legs like the Codling Moth, which see. It leaves the plum and spins up a cocoon on the bark of the trees and amongst grass, etc., beneath them. The moth, which appears in June and July, laying her eggs at the base of the plums, is half an inch in wing expanse;

its fore-wings are purplish-grey clouded with smoky-grey.

TREATMENT.—Band as for CODLING MOTH, which see.

Potato Stem Moth (*Hydraecia micacea*).—This moth, with wing expanse of one and a half inches, has pale brown fore-wings tinged with a rosy hue, and a broad dark patch below the upper border, between the inner line and the elbowed line; its hind-wings are whitish-grey with a darker central line. It appears from August to October, and lays eggs on a variety of plants, and in gardens and allotments, especially upon potatoes. The caterpillar eats up the haulm, soon killing the plants; holes into the stem are noticeable, from which "frass" is pushed out. Pupation takes place in the soil, the insect remaining in that state all through the winter and spring.

TREATMENT.—Cut off and burn with the caterpillar in it all pieces of flagging haulm.

Radish Fly (*Anthomyia radicum*).—This fly is similar to the ONION FLY, which see. Its larvæ attack roots of various crops, including radishes and others. They are footless yellowish-white grubs, pointed in front, and greatly resemble the Onion Maggot.

TREATMENT. — An entomologist states that if the plants are attacked they should be watered once a week with the following: Add a quarter of a pint of crude carbolic acid and a quart of soft soap to a gallon of boiling water. Mix with a force pump, and add to twenty-five gallons of water. Naphthalene will do much to clear infected land if dug in freely.

Raspberry Maggot or Beetle (*Byturus tomentosus*).—This small beetle is about one-sixth of an inch long and is brown in colour, with a dense golden-brown coating when fresh. It occurs when loganberries and raspberries come into bloom, and lays its eggs in the blossoms. The maggots get into the young-forming fruit and live in and around the receptacle, quickly spoiling the fruit. They are yellowish, and have brown marks in the middle of each segment. They are not more than one-third of an inch long, and at the tail end are two curved projecting points. When mature they fall to the ground or get into holes in the cane or pole to pupate for the winter.

PREVENTION AND TREATMENT.—Jar the canes on to tarred boards to catch the beetles, especially when they are seen to be laying their eggs. Cut and clear out all old growth.

Raspberry Shoot Borer (*Lamproma rubiella*).—This small moth is half an inch across the wings, the front pair of which are shiny brown with yellow spots, the hind pair being grey. It occurs at the end of May, and lays its eggs in the flowers, the larvæ feeding in the core of the berries. They leave these before ripe, and fall to the ground, and shelter in a small white cocoon under the rind of the canes, etc., all winter. In the spring they enter the shoots and kill them. The larvæ which pupate in May are red and have a black head; they are about a quarter of an inch long.

TREATMENT.—Cut back all canes after an attack. Apply soot and lime round the stocks in winter. Smear grease over canes in March.

Raspberry Weevil (*Otiorhynchus picipes*).—This is a blunt-snouted oblong weevil, mostly pitchy black in colour, with some parts light brown and ashy, its brown and yellowish-brown scales giving a tessellated appearance. When old the scales are rubbed off. It appears in May in greatest numbers, and eats the foliage and buds of all manner of plants. It lays eggs in the soil and the white footless maggots feed on rootage of raspberries and strawberries, pot plants, etc., pupating in the soil. The beetles only work at night and are very timid, falling on the least jar or flash of light.

TREATMENT.—Spray with arsenate of lead or jar the beetles off at night on to tarred sacks. Treat the soil with soil fumigants such as naphthalene.

Red Spiders (*Tetranychus* and *Bryobia*). — Fruit trees, especially gooseberries and vines, are often attacked by these small mites, which are only just visible to the naked eye. To some extent apples also are attacked, and many greenhouse plants. There are two main kinds, of which the best known is *Tetranychus*, which spins a fine webbing under the leaves, laying its eggs in summer under the webbing, when many broods may occur. The *Bryobias* lay eggs in autumn on the wood and buds of the plants they infect; and small round red bodies hatch in March. The colour may vary from transparent white or green to dull red.

PREVENTION AND TREATMENT.—Fruit trees and bushes which have been attacked should be sprayed in the winter or very early spring before the buds open with caustic soda. In the spring the mites may be killed by spraying with paraffin jelly to which 4 oz. of liver of sulphur to each 25 gallons of wash has been added. Vineries and hot-houses should have frequent and copious syringing with plain cold water or be fumigated with nicotine, sulphur, etc. See article on *FUMIGATING*.

Rhododendron Bug (*Stephanitis rhododendri*).—Undoubtedly this is a very beautiful flat-shaped bug with delicate white network-like wings. It lays its eggs on Rhododendrons, the young sucking the leaves and turning them a rusty colour. Many globules of liquid exude and the foliage is quickly spoilt. It is an introduced and serious pest where it occurs.

TREATMENT.—Spray with paraffin jelly as soon as noticed.

Rose Aphides, or Green and Red Fly (*Aphididæ*). — Three Aphides or Green Fly attack the rose, the chief being *Macrosiphum rosæ*—a green and red Aphis, with black honey tubes, which often smothers the tips of the shoots, leaves, and blossoms. It also lives on the teasel, and may invade roses from that. Young are produced in numbers, and now and then alate females occur and fly to other roses, etc. Another attacks roses, wheat, and grasses (*M. dirhodum*), and a third (*M. rosarum*) seems to live permanently on the rose. All winter mostly in the egg stage, though living females of the first may be found all the winter.

TREATMENT.—Spray with nicotine and soap wash, or quassia wash, as soon as the winged (alate) females are seen on the bushes.

Rose Grubs (*Tortricidæ*).—Several Tortrix moths lay their eggs on roses and produce the common ROSE MAGGOTS, which eat and spin together the leaves, tips, and blossom buds, often completely spoiling the first blooms. They are small moths, seldom more than three-quarters of an inch across the wings. The maggots have six jointed legs in front, and four pairs of sucker feet. They pupate amongst the foliage. Some maggots are dull red (*Pardia tripunctata*), some are brown (*Spilonota roborana*), while others are green (*Tortrix ribeana*), or maybe yellow (*Craesia holmanniana*).

TREATMENT.—Spray with nicotine and soap wash, or kill by hand in small gardens.

Rose Sawflies (*Blennocampa pusilla*, etc.). — Several Sawfly larvæ damage roses. The two worst are the Leaf Roller (*B. pusilla*), and the Rose Slugworm (*Eriocampa rosæ*). The larvæ of the first cause the young leaves to roll inwards at their edges, especially in Maréchal Niel; the latter skeletonise the foliage in the same manner as the Pear Slugworm. See under Slugworm below.

Treatment.—Destroy the first by hand picking. The other pest may be controlled by spraying with arsenate of lead.

Shoot and Fruit Currant Moth (*Incurvaria capitella*).—This is a small moth over half an inch in wing expanse; its fore-wings are brown, and each has a yellow bar and two spots on them. The young larvæ eat into the fruit, and then hibernate. In spring they enter the tips of the shoots, which they quickly kill.

Treatment.—Pick off all flagging shoots and spray in winter with caustic soda wash.

Slugs and Snails (*Limacidæ* and *Helicidæ*).—Both these do considerable damage in the garden, especially to seedlings, beans, lettuces, peas, and young Brassicæ. The grey Field Slug (*Agriolimax agrestis*) is one of the worst, and like all slugs has a small hidden shell. All slugs secrete slime and lay their oval eggs in the soil, the young being similar to the adults. They feed mainly at night, but sometimes in the day in dull showery weather. Winter is passed in the soil and under rubbish.

Several snails attack garden plants, notably the Large Garden Snail (*Helix aspersa*) and the Small Brown or Strawberry Snail (*Hygromia rufescens*). Unlike slugs, they all have a shell into which they can completely withdraw themselves. Snails lay round eggs in groups in moist soil and under boxes, boards, etc. The young resemble the adults, but the shells are at first very frail. Snails usually pass the winter in a dormant state, covering the entrance to their shells with a lid; many are often stuck together in a mass, in rockeries and at the foot of walls, etc. Both kinds have a rasping tongue by means of which they gnaw the tender parts of plants.

Prevention and Treatment.—Dig naphthalene into infected land. Dress heavily attacked plants with soot and lime in wet weather. Heaps of bran mash poisoned with arsenic will kill many slugs, and many patent slug traps are also effective. Collect all winter masses of snails and crush. Protect and encourage thrushes.

Slugworm or Pear and Cherry Sawfly (*Eriocampa limacina*).—This is a slug-like larva which eats the upper skin of pear and cherry foliage, especially in the autumn. The adult Sawfly appears first in May, and lays a single egg in each leaf from below, and the presence of the eggs is told by a small pale speck in the leaves. The larva escapes on the top of the leaf and soon becomes covered with slime. In form it is very marked, being much swollen at the head end, and it has twenty legs. In four weeks it reaches half an inch in length, and then becomes dry and yellowish, falling to the soil to pupate. In the summer this stage lasts a fortnight or three weeks; in winter for a much longer time.

Treatment.—Spray attacked foliage with arsenate of lead, or dust with fine lime.

Small Apricot and Vine Moth (*Batodes angustiorana*).—This is a small Tortrix Moth which feeds upon many fruit trees and now and then may do some harm, especially to apricots, pears, and vines by devouring the foliage and curling it up in the caterpillar stage. The moth occurs from June to

August and is about half an inch in wing expanse; it has red-brown to ochreous-brown fore-wings with reddish-brown markings. It lays its eggs on the twigs, and these hatch in spring. The larvæ are greyish to yellowish-green, and are marked with small pale spots from which hairs arise; their length is about half an inch. The larvæ are noticeable from April to June, and pupate in the tubular leaf chambers.

Treatment. — Spray with nicotine and soap wash, or with arsenate of lead.

Social Pear Sawfly (*Pamphilus flaviventris*). — The orange-yellow larvæ of this Sawfly live under a tent of silk on hawthorn, pear, etc., and do much damage. They have black heads and three pairs of yellow clawlike legs, but no prolegs; they have also two spines at the end of the body and are about an inch long. By August they are all mature and pupate in the soil. The Sawflies appear in May and June, and lay their yellow eggs in groups on the leaves. The female is black, with yellow legs, part of its body is tawny, and there are yellow marks on each side. The male has a reddish-yellow abdomen; the fore-wings having a dusky bar across them.

Treatment.—Cut off the tents, or spray with arsenate of lead.

Surface Larvæ (*Noctuids*).—Caterpillars of the Heart and Dart Moth (*Agrotis exclamationis*), the Turnip Moth (*A. segetis*), and the Yellow Underwing Moth (*Typhaena pronuba*) are very destructive in the soil to all manner of plants. These caterpillars are dull coloured, of various shades of brown, brownish-grey, and dirty green, with darker lines along the body and dull greenish beneath.

They have six true legs in front and four pairs of sucker feet with an anal pair. When mature they are about an inch long. They feed just under the soil by day, but at night crawl out and cut off leaves, which they may pull into the ground, as well as devour the tissue. In some years much damage is done by them, and their evil working goes on from the summer to next spring. When mature the larvæ change to smooth brown chrysalides in the soil. The first two moths have brown fore-wings with various darker markings and pale hind-wings; the Yellow Underwing has the hind-wings of dull ochreous-yellow with a dark band near the edge.

Prevention and Treatment.—Trap the larvæ by placing heaps of bran mixed with arsenate of lead. Dress infected land when digging with naphthalene, applying 2 cwt. to an acre. Frequent side hoeing does good; any grubs which are turned up can be crushed, and many go to the birds. Hand picking the grubs from the soil by scraping them out when working along any row of plants is well worth while.

Thrip or Black Fly (*Thripidæ*).—These are very minute black active insects when mature, with four very narrow wings with long fringes and weak sucking mouths. They feed upon leaves and pods and blossom, often doing much harm in the adult and larval stages. The larvæ are yellow or orange in colour, with six legs, and can run rapidly. They do most harm. One form is very bad on peas, attacking the pods and blossoms; another attacks scarlet runners; while still others attack many greenhouse plants. They lay their eggs in slits cut in the blossoms and leaves, and hibernate at the roots of grass or amongst rubbish. Several species of Thrips also damage apples, pears, and plums, destroying the buds and blossoms.

Prevention and Treatment.—Dress land with soil fumigants and spray attacked plants with nicotine and soap wash.

Tiger Moth (*Arctia caja*).—This large moth is two and a half inches across the wings. Its front wings are creamy, with large black areas, while the hind are bright red, with five black spots. It has a dark head and thorax, also a red abdomen with black bars on it. The caterpillars are called Woolly Bears; they are large, very hairy, dark brownish-black or rusty-red in colour. They feed on strawberry plants and other garden plants, but are of little economic importance.

Treatment.—Collect by hand, if abundant.

Turnip and Cabbage Gall Weevils (*Ceutorhynchus sulcicollis*).—Turnips, swedes, and cabbages are often found to have round swellings on them. These are caused by the maggots of a small weevil, called the Gall Weevil, which is a beetle one-eighth of an inch long. In colour it is blackish, and is covered with a fine grey or white dusting, most pronounced below. It has a long curved snout and elbowed feelers. The female lays her eggs on and in the roots, and from them come the footless white grubs we find in the galls. When mature the maggots eat their way out of the galls and pupate in the soil.

Prevention and Treatment.—Avoid planting any young stock showing signs of galled growth; and avoid planting Brassicæ on land that has been invaded for two years. Dig in naphthalene or other strong soil fumigant and trench vacant ground.

Turnip Flea Beetle (*Phyllotreta nemorum*, etc.).—This is a small beetle, one-eighth of an inch long. In colour it is shiny black, with a yellow or white line on each wing-case. This, with several other allied beetles, attacks turnips, swedes, and Brassicæ generally. The beetles can at once be told by their skipping movements. They eat the seedling plants, later riddle the leaves and often make it necessary to re-sow several times. They hibernate in the winter, coming out in spring, and at first attack charlock and other cruciferous weeds. They lay their eggs on the soil and under the leaves, the little larvæ mining into the leaves as soon as they hatch. When full grown they fall to the earth to pupate. The egg stage lasts from a week to nine days; the maggot stage from three weeks to a month; and the pupa stage from one to three weeks. The maggots of a closely related Flea Beetle (*P. undulata*) live in the soil.

Prevention and Treatment.—Grow the plants in a good tilth and rich seed-bed so as to hurry them into the rough leaf. Steep the seed in turpentine or paraffin for several hours and mix with sand before sowing. Smother the young plants with fine road dust, or apply a "dry spray." If late turnips are sown between early potatoes, the fly does not get near the seedlings.

Turnip Leaf Miner (*Scaptomyza flava*).—This small yellowish fly, about one-tenth of an inch long, lays its eggs on turnip leaves, etc. The green footless maggots tunnel into the leaves and may pupate there. They do little harm. If at any time very abundant on special plants spray with nicotine and soap wash.

Vapourer Moth (*Orgyia antiqua*).—The very beautiful caterpillars of this moth are of various colours. They feed upon roses and fruit trees and do some harm. The female moth is wingless, fat, and grey; the male is winged and is one and a quarter inch in wing expanse, and of a rich chestnut-brown colour. The female lays her eggs on the cocoon spun by the larva, on leaves, outhouses, walls, and such-like.

TREATMENT. — Destroy all egg masses seen, and when the larvæ are prevalent, spray with arsenate of lead.

Wasps (*Vespidæ*).—These often do much damage to ripe or ripening fruit, especially apples, plums, and pears. Two types occur, the GROUND or COMMON WASP (*Vespa vulgaris*), which makes its nest in the soil, and the TREE WASP (*Vespa sylvestris*), and others which form hanging nests in trees, shrubs, kale-pots, etc. These latter are often the most harmful. At the same time we must remember that wasps do much good in early summer by devouring quantities of caterpillars; but the good done does not outweigh the evil.

PREVENTION.—Destroy all queen wasps. Trace nests in soil and fumigate with tar and sulphur or place stick cyanide at night in the nest entrance and close up. Trap with beer and sugar in suspended jars. Shoot down or cut off suspended nests.

Winter Moths (*Cheimatobia brumata*, etc.).—The caterpillars of the WINTER MOTH (*C. brumata*) and allied species, such as the MOTTLED UMBER MOTH (*Hybernia defoliaria*), and the MARCH MOTH (*Anisopteryx aescularia*), attack all kinds of fruit trees and bushes, also roses and forest trees. They are known as LOOPERS owing to their crawling in a series of loops, and also as MEASURERS or CANKER WORMS. The male moths are winged, but the females are quite or nearly wingless. The Winter Moth larva is green with paler and darker lines; the Mottled Umber Moth is rich brown with yellowish side lines, and the March Moth green and thin. These larvæ can be told by having the true six legs in front, only one pair of sucker feet in the middle and an anal pair. The male Winter Moth is an inch across the wings, the front ones brown with darker wavy lines, the hind pair grey. The male Mottled Umber Moth is various shades of yellowish-grey and brown and finely speckled; the March Moth is greyish-brown with paler transverse lines. The females of the last two are entirely wingless, but the true Winter Moth female has little stumpy remnants of wings, useless for flight. The moths emerge from the ground between October and March or even April (March Moth, etc.). The Winter Moth and Mottled Umber Moth lay their eggs singly near the buds, etc.; the March Moth in rings around the year's growth of wood, covered with brown hair. The larvæ feed on buds, foliage, blossom, or fruit, and are all matured by the end of June. They then pass to the soil and pupate there. The eggs hatch just as the buds are bursting in spring.

PREVENTION AND TREATMENT.—Grease band standard and half-standard trees early in October, keeping the bands going all the year round. Spray bush trees and cordons with arsenate of lead, or nicotine and soap wash early in May. Keep poultry when possible in the garden and orchard under the trees. See that all egg bands of the March Moth are cut off and burnt when pruning.

Wireworms (*Elateridæ*). — The larvæ of Click Beetles are the well-known Wireworms, which are often such serious pests in the garden. The adult Click Beetles are brownish and can be told by their curious skipping movements, which are attended by a "clicking" sound. These beetles may be found almost all the year, but mostly out of doors in June and July. They lay their eggs in and on the soil, especially preferring land covered with dense vegetation, such as grass land, clover-ley, or where there is much weed growth, but will also lay freely even in clean land. As is well known, wireworms are a shade of yellow or yellowish-brown, and have a hard smooth skin, a brown head, with biting jaws, and a few fine scattered hairs. They have three pairs of jointed legs on the first three rings of the body, and under the tail end is a small rounded process. These larvæ, which may reach an inch in length, live in the soil for three to four years, and even five, feeding most of the time on the roots and tubers of different plants. In cold frosty weather they pass deeper into the soil and thus escape harm. When they are full grown they change in the soil into pupæ and emerge in winter or spring, and later come up as perfect Click Beetles.

PREVENTION AND TREATMENT.—The damage done by Wireworms may be prevented by (i) deep and clean cultivation; (ii) the use of stimulating manures; (iii) drilling the manure with the seed; (iv) the growth of crops not attacked to any extent, such as beans, onions, peas; and (v) by digging in naphthalene at the rate of 2 cwt. to the acre, all of which act as deterrents but do not, it seems, kill the insect. Wireworms may be trapped with pieces of carrot, potato, or turnip placed in the ground and lifted weekly. The Click Beetles may be trapped by enticing them to lay their eggs under heaps of clover or lucerne covered with a few tiles or boards. Land badly attacked should have mustard grown on it and green matter dug in. When grass land is dug up the turf should not be taken off but deeply buried.

Wood Leopard Moth (*Zeuzera pyrina*).—This is a moth one and a half to two inches across the wings. It is white, but spotted with deep steel blue on the front wings, with smaller specks on the hind. It occurs in June and July, and its larvæ tunnel into the wood of the apple, cherry, chestnut, pear, plum, etc., and especially into the small branches.

They are yellowish-white, spotted with black, and after ten months of life reach two inches in length. They then spin silken cocoons covered with bark chips in which they change to brown pupæ.

TREATMENT.—Cut off and burn all small branches seen to be flagging, down to the end of the black tunnel, formed by the caterpillar. If the attack is low down, place pieces of potassium cyanide in the holes as for GOAT MOTH.

Woodlice (*Omiscidæ*). — These creatures, which are related to crabs and lobsters, are often called MONKEY PEAS, SLATERS, and SOW-BUGS. They breathe by means of little gills attached to the base of the legs, and some can curl themselves up into a ball. They damage seedlings, and are often harmful in frames and in mushroom pits. They love moisture and are mainly nocturnal, hiding away amongst any rubbish and in crevices all day. The young are very similar to the adults.

PREVENTION AND TREATMENT.—Trap by placing flower-pots half-filled with moss and fresh horse manure on their sides; they collect there and so are easily caught. Remove all rubbish from, in, and around frames. When frames are cleared pour plenty of boiling soap and water into the crevices.

Woolly Aphis, or American Blight (*Schizoneura lanigera*). — This is an Aphis which lives on the roots, trunk, branches, shoots, and foliage of the apple and elm. It produces a quantity of white flocculent wool. By means of the constant puncturing of the bark or skin galled growths are formed both above and below ground on the apple and thus much harm is done. There is a migration between the roots and trunk, also a migration to elm trees, where the sexual brood occurs and eggs are found during winter. The progeny on the elm becoming winged, fly away to the apples in early summer. They can, however, live and reproduce asexually on the apple alone for many years.

Prevention and Treatment.—Keep the trees clean by winter spraying with caustic soda wash. Spray attacked trees with paraffin jelly, or paint the woolly patches with methylated spirits. Dress attacked soil with naphthalene, at the rate of about 2 cwt. per acre, forking it well in at once.—F. V. T.

INSECT PESTS: General Methods of Destruction.—Having described a few of the numerous insect pests which worry the gardener, we give below some notes on the making of various sprays, washes, etc., which are there recommended for destroying the various pests. No good purpose, for instance, could be served by repeating the formula of Paraffin Jelly every time it is mentioned, since it would be mere repetition. Many books might, however, be written on General Methods of Destruction of Insect Pests, so it will be obvious that the few notes that follow might be amplified very much. However, we prefer to describe the ways of making a few of the most important and most frequently employed insecticides, rather than cover many pages in describing the preparation of every wash that is known. Those we describe will cover, it will be found, practically the whole ground, and this being the case, little attention need be paid to the preparation of special washes which are not described in these notes.

In most cases the gardener can obtain the preparations described below ready-made from any reliable horticultural sundriesman, and although in such cases as Lime Sulphur Wash and Arsenate of Lead it is far better to rely on preparations made by experts under chemical supervision, in others the washes may be prepared quite easily and quickly by the gardener himself. Care should, however, be taken to measure or weigh up the various chemicals and liquids referred to exactly, since a small error in such as Arsenate of Lead, or other poisonous chemicals, may lead to serious loss instead of benefit. The gardener will find our article on *Weights and Measures* useful here.

One point more before we describe the mixtures themselves. There are certain washes highly praised in many gardening books, such as American Paraffin Emulsion, Paranaph, Resin Spray, etc.; these are not included in the present article since they are not of any special value here. Soil fumigants as such, are also excluded, as they receive full attention in our article on *Soil Fumigating*.

Arsenate of Lead.—This is used for killing biting or leaf-eating insects, such as Caterpillars and Beetles. The formula is—

Arsenate of Soda (Com.) .	2 oz.
Acetate of Lead . .	7 ,,
Water	10 gals.

Dissolve the two chemicals in water, and apply as a fine spray. Various commercial "pastes" are on the market, and may be obtained ready for use on being mixed with water. This wash may be used with Bordeaux Mixture.

Caustic Soda Wash.—This is used for cleaning fruit trees, and destroying scale-insects, also the wintering little Ermine Moth larvæ. Its formula is—

Caustic Soda (Com.) .	2 lb.
Water	10 gals.

Dissolve the Caustic Soda in a little cold water, and dilute with the remainder. Keep the liquid off the hands and clothes, as it is very corrosive. Apply with considerable force as a spray, not later than the end of February, and never use except on dormant fruit trees.

Hellebore Spray.—Hellebore is an intensely poisonous and strong smelling powder, which is useful as an insecticide for Sawfly larvæ where Arsenate of Lead could not be used. It is not, however, nearly so efficacious. The formula of the spray is—

Hellebore Powder . .	4 oz.
Water	10 gals.

Hellebore should always be dissolved in a little hot water first, and then the mixture diluted to required strength. The eyes, nose, and throat must be protected when using it.

The powder itself may also be used dry as a dust. As a modern insecticide, however, it may be discarded.

Hydrocyanic Acid Gas.—This is used for fumigating glasshouses and fruit trees in order to kill Mealy Bug, Scale, and other insects. The formula is—

Potassium Cyanide (98 per cent. purity) . .	1 oz.
Sulphuric Acid (Sp. Gravity 1·83) . . .	1½ oz.
Water	3½ oz.

For hardy or dormant plants use 1 oz. of Potassium Cyanide to 200 cubic ft. of space, and for tender plants use 1 oz. of the Cyanide per 500 cubic ft. The method of estimating the cubical air contents of greenhouses is dealt with in our article *ARITHMETIC AND GARDENING*.

As the gas is exceedingly dangerous to human beings, precautions must be taken before adopting this method of destroying pests. Special appliances are thus necessary to enable the house to be worked from the outside, and such can be obtained from horticultural sundriesmen. The house should be as dry as possible, the temperature not exceeding 60° F.

First make the house as air-tight as possible, and pour the Sulphuric Acid slowly into the water, using an earthenware or non-metal jar. Then drop the Cyanide into it, and note that the deadly fumes come away at once. Leave the house sealed up for at least an hour, after which ventilate completely before attempting to enter it. One machine will be needed for each 10,000 cubic ft. of space treated.

Fruit trees, before planting, may be put into small air-tight houses or sheds, and left for at least three hours, to kill Scale, Woolly Aphis, etc., upon them.

Lime Salt Wash.—This is most effectual in the cleaning of orchard trees, and for killing Apple and Plum Aphis. It also checks the Apple Sucker and Apple Blossom Weevil. It is one of the most useful washes of all, since the lime and salt return to the soil, and much improve the health of the trees, so that they are better able to resist disease. The formula is—

Quicklime . . .	1–1½ cwt.
Common Salt . .	5 lb.
Water . . .	100 gals.

Slake the lime up with water, and then strain through a coarse piece of sacking into the salt and water. Apply as a thick spray any time between late February and the bursting of the buds.

Lime Sulphur Wash.—This is most useful for destroying Scale insects in the winter and summer. It is difficult to mix accurately, and gardeners are advised to purchase it ready-made from any reliable firm.

London Purple.—This is a waste product which contains much soluble Arsenic, and unless lime is added, very serious scorching will take place. We cannot recommend it highly, as its killing power is low compared to Arsenate of Lead, and its evil effects are too frequent. The formula, however, is—

London Purple . .	3 oz.
Quicklime . . .	3 „
Water	40 gals.

Apply as a spray any time during the growing season.

Nicotine and Soap Wash.—This is a most powerful insecticide for the destruction of Aphis, Apple Sucker, Cuckoo Spit, Leaf Miners, and all forms of young Caterpillars. Its formula is—

Nicotine (96 per cent. purity) . . .	1½–2½ oz.
Soft Soap . . .	4 „
Soft Water. . .	20 gals.

Pour the Nicotine into the dissolved soap in the water, and apply as a fine spray, but avoid using it on any plants the leaves of which are likely to be cooked or eaten in less than four or five weeks. The same remark applies to fruit.

Paraffin Jelly.—This is most useful for killing Aphis, Leaf Hoppers, Red Spider, and Scale. Its formula is—

Paraffin	5 gals.
Soft Soap . . .	8 lb.
Soft Water . . .	10 gals.

Simmer together in a closed copper, and when boiling add a few pints of water. When all is dissolved pour into a pail or barrel, when it will soon become a thick jelly. The formula used for spraying is—

Paraffin Jelly . . .	10 lb.
Water	40 gals.

This should be applied in the form of a fine spray at any time throughout the growing season.

Paris Green.—This insecticide was much used at one time, but owing to the fact that it frequently produces scorching, its place has long since been taken by Arsenate of Lead. Although it is frequently recommended in many gardening books, no one with any experience advises its use. However, for those who must have it, the formula is—

Paris Green Paste . .	1 oz.
Quicklime . . .	1 ,,
Water	10 gals.

The paste must be carefully shaken up with a little water, and strained, after which the lime is added. It must be constantly stirred and applied as a fine spray.

Pyrethrum Powder and Spray.—Pyrethrum is used by gardeners for all biting insects both as a wet spray and a dry spray. It may also be used as a fumigant under glass. The formula of the wet spray is—

Pyrethrum Powder .	2–3 lb.
Water	10 gals.

The fresh powder is infused in a little hot water for at least 3½ hours. The liquid is then strained off, and added to the full amount of water. When cold the liquid is used as a spray.

The dry powder may be dusted freely over the plants when they are wet with dew.

Pyridine and Soap.—This is chiefly used for killing Cuckoo Spit and Aphis. Its formula is—

Crude Pyridine . . .	4 oz.
Soft Soap	2 oz.
Water	10 gals.

Mix the Pyridine in a little warm water. Add the soap previously dissolved in half a gallon of water. Stir well, and dilute to 10 gals. Apply as a forceful spray as soon as attacks are noticed.

Quassia and Soap.—This most useful simple wash is valuable for Aphis of the non-mealy or woolly sort. Its preparation is described in our article on *Quassia*.

Tobacco Wash.—This is not so reliable as Nicotine and Soap Wash, and as Tobacco Waste is difficult to obtain; the only way one can use any Tobacco Wash in this country is to rely on a commercial firm for making the same. The formula, however, is—

Tobacco Waste . .	4–6 lb.
Soft Soap . . .	1–2 ,,
Water	20 gals.

The Tobacco Waste is infused in water, and this is constantly agitated. A pinch or two of soda is added, and then the solution is mixed after straining, with the dissolved soap and water.

Woburn Winter Wash.—This useful wash is used for destroying Mussel Scale, and generally for cleaning fruit trees. Its formula is—

Paraffin (Solar distillate) .	10 pts.
Iron Sulphate . . .	1 lb.
Quicklime . . .	½ ,,
Caustic Soda . . .	4 ,,
Water	20 gals.

Dissolve the Iron Sulphate in 18 gallons of water, and slake the lime in a little water, adding a little more to make it into a milk. Then run the milk into the dissolved Iron Sulphate through a fine sieve, finally churning up the oil into the Iron Sulphate and Lime, adding last of all the Caustic Soda. Apply as a heavy spray during the winter when the trees are dormant.—F. V. T.

See also *Soil Fumigating* and *Soil Sterilisation*.

INSECTICIDES.—See *Insect Pests: General Methods of Destruction* and *Soap Washes: Their Use in the Garden*.

INTERCROPPING.

There appears to be some doubt as to the exact meaning of the term "intercropping." People confuse it indiscriminately with catch cropping, with rotational cropping, and even with successional cropping. But, very briefly, intercropping is the act of growing one maincrop subject between another.

In the article on *Catch Crops* we saw how to grow quickly maturing crops between those which stand longer upon the ground, and the question that every gardener has to answer for himself before proceeding far into the matter of intercropping is whether it is applicable in his case and in his district or not. Intercropping is a matter on which there are many opinions, and it is doubtful whether it pays in suburban areas, where there is much smoke in the atmosphere or anything else to hinder the proper and rapid development of the crops. Given a genial climate in the south of England, far away from varnish, steel, soap or other factories, with a warm, light soil, a moderate rainfall, and a little knowledge of the culture of vegetable crops, there is no reason why intercropping should not be the great success we wish. In the absence, however, of these conditions it is better to leave it alone.

If intercropping is to be successful, then the originally intended maincrops must be set at slightly greater distances apart than is usually allowed. No good purpose can be served by crowding, and what is winked at in the case of catch crops must be treated with contempt in the case of intercropping. Savoy cabbages, broccoli, curled greens, maincrop potatoes, cauliflowers, red cabbage, chou de burghley, Brussels sprouts, and kale are all crops which can be grown on the intercropping system. As, however, all of these take up considerable space, if one is to be planted between the other, room must be allowed for their proper development.

One of the greatest essentials in successful intercropping is a rich soil, and if this is non-existent it would be foolish in extreme to tax the already poor soil by growing two crops instead of one at the same time. It would also be foolish to plant one crop between another before the first crop was anything like matured, in the hope that the second crop might get food enough to develop when the first had been taken from the land. Much, however, can be done by the use of suitable liquid animal manures or fertilisers, and certainly for all successful intercropping these liquids must not be stinted. Strong plants are the first essential, and any one who has seen cabbages, etc., struggling for life between rows of maincrop or early potatoes will realise how strong each subject must be. The after care of all intercropped areas is the same as that given to those which are grown in the ordinary way, namely, frequent hoeing and weeding must be carried out, and the crops lifted, cut, or harvested at a suitable time.—E.

INTUMESCENCES.—See *DISEASES OF PLANTS.*

INULA (FLEABANE. Nat. Ord. Compositæ).—This may be said to be a flower of the future. So far there are not a great number of sorts offered by the trade to choose from, nor are the flowers as attractive as some. The plants, however, come in very well for shrubbery borders, sunny spots in the wild garden, or the mixed border, but they are hardly of sufficient merit to be put among one's choicest plants in the perennial border.

Culture.—But little difficulty will be found in growing these even by amateur gardeners and beginners who have no experience of gardening. They may be planted any time from the early winter onwards into the early spring, and are easily propagated by seeds sown in the usual way, or division of the rootstocks; this last operation being conducted in November or February. A position in full sun suits them; we grow ours in a mixed border facing due south. They will thrive in any garden soil of fair quality. If large flowers are required, abundance of water should be applied in hot seasons, and weak liquid manure will also be a decided help.

What to Grow.—We recommend the following :—

Inula glandulosa. — A desirable sort, with golden-yellow flowers. These are produced in July and onwards. The height is about 2 ft.

I. grandiflora.—This large free-flowering yellow sort, blooming from July well into the autumn, is by some authorities considered synonymous with *Helenium grandiflorum.* Its height is 2–3 ft.

I. Helenium (ELECAMPANE).—This is sometimes mistaken for an *Helenium.* It is a yellow summer-flowering sort, averaging 1 yd. in height.

I. Hookeri.—Probably the most popular sort of all. Its flowers are, as usual, yellow, and are large; they come later than the other sorts, the plant being at its best in August. The height averages rather less than 1 yd.

I. macrocephala. — This useful yellow flowering sort, coming in at the same time as *Inula grandiflora*, appears to be synonymous with *I. royleana.* It averages 3 ft. in height.

I. royleana.—This bears attractive yellow flowers from July to September, and averages 3 ft. in height.

See also ELECAMPANE in *MEDICINAL HERBS.*

IODAME (*Quercus glandulifera*).—See *TREES.*

IONOPSIDIUM.—A synonym for COCHLEARIA. See *VIOLET CRESS.*

IPOMOEA (Nat. Ord. Convolvulaceæ). — This a very large genus composed mostly of climbing plants, the greater part being tropical or sub-tropical perennials. There are a few annual species which need to be grown in a warm house in this country, but the one hardy annual species, *I. purpurea* (Syns. *Convolvulus major*, *C. purpureus*, and *Pharbitis hispida*), is well known in gardens, and the parent of a race of popular summer-flowering climbing plants. Seedlings may be raised under similar treatment to that found successful for half-hardy annuals, but unless each seedling is placed in a separate pot quite early in its career there is likely to be loss and disappointment when planting is done. The expression "hardy" requires a little qualification in regard to *Ipomoea purpurea*—it is nearly, but not quite, hardy in the majority of British gardens. Early May is soon enough to make a sowing out of doors, and late May or early June quite soon enough to plant out seedlings raised under glass. For covering arches, trellis work, and for wreathing windows, this plant, popularly known as the MORNING GLORY, is charming, no matter what the colour of its flowers may be, and the colour range extends from white, through pink, rose, and crimson, to purple, pale blue, and various striped shades. There are double as well as single varieties, but the latter are the most popular. The flowers of both are short-lived, it is true, but so freely produced that this defect is hardly noticed.

The typical *I. purpurea*, and its varieties *elatior*, white and blue, and *varia*, white, striped blue, or pink, were valued in gardens in our great-grandfather's days, and each was figured in the *Botanical Magazine* about a hundred years ago.

C. H. C.

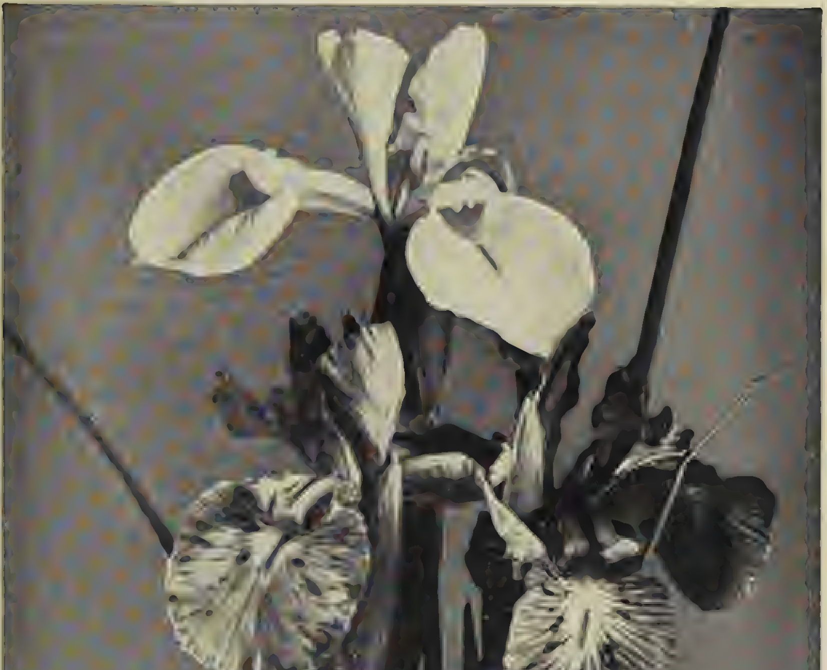
See also *CLIMBING AND TRAILING PLANTS.*

IPOMOPSIS.—Now included in the genus *GILIA.*

IRIS.—See *IRISES.*

IRISES (Nat. Ord. Iridaceæ).

The Iris genus is confined to the northern temperate zone and numbers more than one hundred and fifty species, distributed from California in the West to Japan in the East, and from Alaska in the North to Hong-Kong in the South. Many of the species hybridise readily with one another, and a large proportion of the Irises usually seen in gardens are of hybrid origin and not wild species. Most Irises flower in the first six months of the



ENGLISH BULBOUS IRIS

year, while a few flower somewhat irregularly in the autumn.

BULBOUS IRISES.

1. THE RETICULATA SECTION.—All the members of this section have bulbs with outer coats formed of a network of coarse fibres. The so-called type *I. reticulata* is of a deep blue colour with a central streak of orange on the falls, and slender four-sided leaves. It is probably much rarer in the wild state in the Caucasus than its red-purple counterpart, *I. Krelagei.* They both flower in February and March.

I. Histrio from Syria is less hardy and has flowers brightly mottled with two shades of blue, while the still more delicate *I. Vartani* from Palestine has flowers of a pale grey blue with a strong scent of almonds.

I. histrioides from Northern Asia Minor is far more vigorous and has large flowers of a bright steel blue which appear as soon as the leaves pierce the ground. The dwarf *I. Danfordiae* from Central Asia Minor has brilliant yellow flowers.

All the members of the section seem to prefer a good soil, rich in humus, but at the same time warm and well drained. The bulbs should be lifted annually and replanted in fresh ground after a short interval; if left undisturbed, they sometimes increase rapidly, but often fall victims to a fungoid disease. The flowers are stemless, but are raised on long perianth-tubes to a height of 6–9 ins. above the ground.

2. THE JUNO SECTION.—These Irises are distinguished by their broad, channelled leaves and by the fleshy tuberous roots that remain attached to the bulb in its resting state. *I. alata* from Spain, Sicily, and North Africa, and *I. palaestina* from Palestine are autumn- and winter-flowering species which unfortunately cannot be relied upon to ripen their growth in this country so as to form flowering bulbs for the next season. Height, 6–8 ins.

I. persica, with flowers of blue-green and brown-purple, is a difficult species to grow except in stiff loam, but well repays any trouble, as do also its near allies *I. Heldreichii* or *stenophylla,* with flowers of two shades of blue-purple, and the red-purple *I. Tauri.* None of these grow more than 6 ins. high.

I. sindjarensis from Mesopotamia grows to a foot or more in height, and needs a stiff soil. It bears pale blue flowers and has produced some beautiful hybrids with the various members of the persica group.

The following species come from farther east in Central Asia and are better suited to a light sandy soil well enriched with old manure and leaf-soil: *I. Rosenbachiana,* with flowers of every shade of blue- and red-purple—height, 8 ins.; *I. bucharica,* a very vigorous grower with white and yellow flowers; *I. orchioides,* wholly yellow; and *I. Warleyensis,* of a rich purple with a conspicuous yellow blotch. The last three species hybridise easily together, and give rise to a number of intermediate forms; height, 12–18 ins., flowering in March and April.

3. THE XIPHION SECTION.—The members of this section are chiefly confined to Spain and Portugal, with outlying members in North Africa and South-Western France. *I. Xiphium,* the wild type of the well-known Spanish Irises, has blue flowers, but has given rise in cultivation to innumerable varieties. Yellow forms are obtained from the nearly allied Portuguese *I. lusitanica,* while *I. filifolia* from the extreme south of Spain and the neighbourhood of Tangier has flowers of a magnificent red-purple shade. The giant *I. tingitana* does not flower freely except in very warm and sheltered

positions. Its bulbs need very rich feeding if they are to become strong enough to bloom. All the above species like a soil that becomes warm and dry in the late summer, but the so-called English Iris, *I. xiphioides*, which is really a native of the Pyrenees, needs a cool, moist position to do well. The wild plant has flowers of a deep blue, but under cultivation has given rise to many varieties of all shades of purple, ranging from the deepest blue to pure white. The members of this section vary in height from 12 to 24 ins., according to soil and position.

NON-BULBOUS OR RHIZOMATOUS SPECIES.

These have a rootstock consisting of a rhizome or underground stem, and are divided into *Pogoniris*, of which the flowers are bearded, and *Apogon* species, which are beardless.

Pogoniris or Bearded Species.—These are perhaps the best known of all Irises. They range from the dwarf *I. pumila*, which sends up its stemless flowers in April, to the 4 ft. high *I. trojana* and *I. mesopotamica*, which do not flower until June. The wild species are confined to Central and Southern Europe and Western Asia. Species and hybrids alike all prefer a good rich soil plentifully supplied with lime, and it is essential that the positions chosen should be well drained and sunny. The plants should be lifted and replanted every two or three years, and the best time for this operation is immediately the flowers have faded, though it may be carried out with success as late as August or even in early September. If the rhizomes are replanted after that date, root growth has practically ceased for the year, and the plants are therefore unable to anchor themselves in the ground before winter. In soil not deficient in lime these Irises are rarely attacked by disease, and the one disease to which the rhizomes sometimes fall victims is easily checked by a liberal application of superphosphate of lime, which should be watered in, if the soil and the weather are dry.

There are many species of bearded Iris, of which some have given rise to innumerable hybrids. Among the more desirable are: *I. pumila*, very variable as to colour in the wild state; of garden forms, *coerulea* is one of the most pleasing, 6 ins., April; *I. Chamaeiris* may be obtained in white, yellow, red-, or blue-purple forms, 6–12 ins., April and May; *I. arenaria*, bright yellow, 4–6 ins., May; *I. aphylla*, with a branching stem and flowers of blue- and red-purple, very hardy and floriferous, 12–18 ins., May; *Caparne hybrids* or intermediates between the foregoing and the later and larger species, 12–18 ins., May. Some of the best are: *Ivorine*, ivory white; *Queen Flavia*, deep yellow; *Don Carlos*, deep blue; *Dorothy*, grey blue; the so-called *Germanica Hybrids*, though it is probable that no such wild species as *germanica* ever existed. Some good forms are *Kharput* (28 ins.), red-purple; *Amas* or *macrantha* (24 ins.), blue-purple; *Oriflamme* (30 ins.), an improvement on *Amas; Kochii* (18 ins.), a dwarf dark red-purple; *florentina* (24 ins.), white, tinged with faint blue. Other good plants are: *albicans* (24 ins.), pure white, the albino form of the blue-purple *Madonna* (24 ins.); *pallida* (12–36 ins.), in all shades of blue and red-purple, e.g. *dalmatica* (30 ins.), pale lavender, *Ciengialti* (15 ins.), dwarf blue, *Goldcrest* (26 ins.), a taller blue; *Monte Brione* (30 ins.), red; *Ed. Michel* (30 ins.), red; *Mrs Alan Grey* (24 ins.), *Queen of May* (30 ins.), *Her Majesty* (30 ins.)—all good pinks; *Mme Chereau* (36 ins.) and *Jeanne d'Arc* (30 ins.), white, edged blue and purple; *Prosper Laugier* (36 ins.), *Isoline* (36 ins.), *Alcazar* (30 ins.)—all of mixed and almost indescribable colouring; *Black Prince* (30 ins.), very late, of light and dark blue-purple; *Thorbecke* (30 ins.), white and deep purple; *variegata* (12–30 ins.), yellow with purple and mahogany veining, of which the best forms are *Iris-king* (30 ins.), *Gracchus* (24 ins.), and *Maori-king* (24 ins.); *trojana* (40 ins.), tall and late, with flowers of two shades of red-purple on much-branched stems.

Oncocyclus Irises are a peculiar group of species confined to Asia Minor, Syria, and Persia. They have broad straggling beards and only one flower, often of immense size, on the stem. They are difficult to grow, but so amazing in their shape and colouring as to be well worth the effort. The rhizomes must be planted in October in a warm, well-drained position in strong, rich soil. They should be lifted in July and kept dry till October. *Iberica* (8–12 ins.) is one of the easiest; *paradoxa* (12–18 ins.), *Lortetii* (20 ins.), *Gatesii* (20–24 ins.), *susiana* (24 ins.), *Sari* (15 ins.), *acutiloba* (12 ins.) will all repay successful cultivation.

Regelia Irises are closely allied to the Oncocyclus species. They produce two or three flowers on each stem and, though needing the same treatment as the Oncocyclus species, are quite easy to grow under those conditions. Only three species are commonly in cultivation, but all are worth growing: *Korolkowi* (12–18 ins.), *stolonifera* (12–24 ins.), *Hoogiana* (24 ins.).

Regeliocyclus hybrids between the above groups combine some of the features of both and grow more vigorously. Some of the best are *Charon*, *Persephone*, *Sirona*.

APOGON OR BEARDLESS SPECIES.—Of these there are a number of groups and some isolated species, several of which have given rise to garden forms.

The *sibirica* group needs cool soil, rich in humus. The best are the type and its albino form, *I. sibirica* and *sibirica alba* (18–36 ins.); *I. orientalis* and *I. orientalis alba* (Snow Queen) (24–30 ins.); *Wilsoni* (30 ins.) and *Forrestii* (18 ins.), yellow; *chrysographes* (18–24 ins.), very rich dark purple with gold veining; *Clarkei* (18–24 ins.), of various shades of purple; *Delavayi* (36 ins.), tall and late, of various rich shades of purple.

Bog Irises are our native *Pseudacorus* (36–40 ins.), yellow, and its American counterpart *versicolor* (24–36 ins.), with a good crimson form *kermesina*; *laevigata* (18–24 ins.), a rich blue with a pure white form and another spotted with blue (*albopurpurea*); *Kaempferi* (24–36 ins.), the Japanese Iris, with its innumerable varieties, which must have rich soil and moisture.

Many Apogon Irises do well in borders of rich, well-manured soil. Among these are: *spuria* (24–48 ins.), of various shades of purple; *ochroleuca* (36–48 ins.), white and yellow; *aurea* (36–48 ins.), deep yellow; *Monnieri* (36–48 ins.), lemon yellow; *Monspur* (36–48 ins.), a hybrid between *Monnieri* and *spuria*. All these have tall, stiff, narrow foliage and tall stems, bearing flowers of the shape of the Spanish Iris, arranged in a spike one above the other.

I. longipetata (24 ins.), *I. l. montana* (18–24 ins.) (*tolmeiana*), and *Tollong* (24–30 ins.) are an American group of good border plants. The Californian species *douglasiana* (12–24 ins.), *tenax* (12–18 ins.), *Purdyi* (12 ins.), *bracteata* (18 ins.), *macrosiphon* (12 ins.), *Watsoniana* (18–24 ins.) show amazing variety of colour, each individual plant being different. They are, however, not easy to move, but succeed well in light, rich soil, free from lime. They should be raised from seed and planted out where they are to bloom.

Our native *foetidissima* (18–24 ins.), with lead-colour or yellow flowers, will grow in half-shady places among trees, and its scarlet seeds are decorative in winter.

I. ensata forms huge tufts of foliage, which remain green in the hottest seasons and produce numerous stems with small graceful flowers in May. Its colour is mostly a blue purple, but there are white and dark forms and a Tibetan variety with larger flowers of primrose shaded with blue-grey.

I. ruthenica (6–9 ins.) is a dwarf plant well suited for edges or for growing on a rockery. The best form is very floriferous and bears blue flowers in May.

I. graminea (12–24 ins.) is a good plant for the front of a border and should be grown for the scent of its flowers, which is like that of a ripe greengage.

I. unguicularis (*stylosa*) is one of the most valuable of winter-flowering plants and should be given the best available position, close against the foot of a south wall, by preference against the wall of a greenhouse, where it will be helped by the warmth from within. It should be planted in early September in rather poor soil with some lime rubble and then left undisturbed. Each autumn the old leaves should be cleaned from the clumps, which must be carefully searched for slugs and snails which take refuge in them and eat the buds. No stem is produced, but the perianth-tube grows to a length of 6 ins. The flowers should be gathered in bud and allowed to open indoors. There is an ivory white form which is scarcely so good as the lavender purple type. *Speciosa* is a dwarf late-flowering form with deep, richly coloured flowers.

All Apogon Irises should be moved in early autumn while the soil is still warm enough to encourage fresh root action, so that the plants become re-established before winter. They must not be allowed to become dry, and must therefore be watered in periods of drought.

Evansia Irises form a connecting link between the bearded and the beardless species, for the flowers bear a linear crest, something like a cockscomb. *I. cristata* (6 ins.), *gracilipes* (10 ins.), *lacustris* (4 ins.) are dwarf rockery species, which must have half-shade and soil rich in humus. They are easily managed if moved immediately the flowers have faded. Upheaval in autumn is nearly always fatal. *I. Tectorum* (18 ins.) and *Milesii* (30 ins.), the first dwarf and the second tall, have flat fringed flowers and are good border Irises, if frequently lifted and replanted. *I. japonica* (24 ins.), lilac, and *Wattii* (36–48 ins.), white, are species for the cool greenhouse, with branching sprays of delicate fringed flowers and evergreen foliage.

Propagation of Irises.—This is easily carried out either by dividing the rhizomes in the case of named varieties or by seeds in the case of the species. Seeds should be sown when ripe in pots of light soil enriched with leaf-mould, and the pots should then be plunged to the rim in the open ground. Seeds of species will then germinate in the spring, and the seedlings may be planted out in their permanent quarters as soon as they possess about four leaves. Seeds of hybrids germinate more irregularly and, if they are of any value, the ungerminated seeds should be sifted out and resown when the seedlings are put out. Seeds have been known to lie dormant in the soil for eighteen years and then to germinate and produce healthy plants.—W. R. D.

Up-to-date Selections.

Iris Abdera. — Violet-lavender, white, and orange.

I. Ariel.—Violet-lavender, rose and orange.

I. Benbow.—Blue-lavender and yellow.

I. Bruno.—Violet bronze on cream, purplish crimson, and orange.

I. Cardinal. — Bronze-purple, purple, and beard-white and orange.

I. Centurion.—Violet-blue, violet, and orange.

I. Duke of Bedford.—Violet blue-bronze, deep violet, and orange.

I. Dutch Wedgwood. — Pale blue and gold.

I. Eglantine.—Mauve-lilac, brown veins. Beard-white and orange.

I. Egypt.—Violet, yellow, violet-purple, cream, and gold.

I. Flaming Sword.—Yellow, chestnut-red, maroon, orange, and bronze.

I. Flutter-by. — Yellow-cream, cream, and orange.

I. Germaine Perthuis. — Violet-bronze, violet, and orange.

I. Gudrun.—White, veined gold, beard-orange.

I. Harmony.—Blue-violet, blue, and orange.

I. Hemodus. — Violet-lavender, white, and orange.

I. India.—Blue-lavender, violet, brown, white, and yellow.

IRISH GARDENING.

Gardening in Ireland, as in other countries, is largely controlled by climate and soil. Round the coast, especially in the South and West, the climate is comparatively mild, but against this there is the fact that in the extreme West strong winds from the Atlantic militate against satisfactory growth. On the other hand, even as far North as County Down, notably about Rostrevor, Castlewellan, and Newcastle, the climate is not unlike that of Fota in the extreme South, where, during the summer, the conditions are almost sub-tropical. In the vicinity of the Kenmare estuary and about Bantry the climate is milder than anywhere else in Ireland. In the midland counties, however, away from the influence of the sea, the climate is colder and more like that of many parts of Britain, but probably with a moister atmosphere. The soil, too, varies considerably, a great deal of it being calcareous. But in County Wicklow, where some of our most famous gardens are situated, there is little or no lime, and consequently Himalayan Rhododendrons and plants of the heath family generally flourish exceedingly well. This is true also of the milder parts of the North, and many similar plants grow there luxuriantly. It is noteworthy that at Howth, in County Dublin, Rhododendrons are a feature where sheltered from wind, the reason being the comparative mildness due to proximity to the sea, and the fact that the rock composing the hill of Howth is not of limestone; elsewhere in the county lime is present in quantity.

Thus it will be seen that no hard-and-fast rules can be laid down for gardening in Ireland, and the idea, common in Britain, that the climate is uniformly mild is quite erroneous. The mild districts alluded to are as a general rule so favourable to the growth of half-hardy plants that a large number are from time to time planted in the open. Many flourish for years, and astonish visitors, who are accustomed to see the same plants in greenhouses; yet the disastrous winter of 1916–17 killed more plants in Ireland than anywhere in the United Kingdom for that very reason.

During the summer of 1917 a fairly complete census was taken of plants killed and injured during the previous exceptional winter. From that it is possible to gain a fair idea of those which can be depended on for permanent effect.[1]

Trees and Shrubs.—Australia, Chile, the Himalayas, and Peru are some of the countries from which come many of the trees and shrubs characteristic of Irish gardens where the owners are enthusiastic.

Australian shrubs are represented by *Grevillea rosmarinifolia* and

---

[1] For lists see *Irish Gardening*, vol. xii, pp. 137, 138, 139, 140, 141, and 150.

Grevillea juniperina. The former is a handsome plant of dwarf spreading habit, leaves dark shining green, flowers red in clusters. The other is more erect, with narrow rigid leaves and yellow flowers. *Drimys aromatica* is an interesting plant also, suitable for the warmer districts. It forms a well-furnished bush with highly aromatic leaves.

From Chile we have the glorious *Embothrium coccineum*, which in some gardens is well over 30 ft. high, and bears masses of its beautiful scarlet flowers; *Eucryphia pinnatifolia*, a beautiful plant of the rose family with handsome white flowers, is evergreen, or nearly so, in mild localities, deciduous elsewhere; *Fuchsia macrostemma*, with attractive bright green leaves and long slender scarlet flowers, makes an attractive wall plant; while its varieties or hybrids corallina, globosa, gracilis, and Riccartoni are among the most delightful of autumn-flowering shrubs. *Fuchsia Riccartoni* will form large handsome bushes where allowed room to develop. *Abutilon vitifolium* is hardy in many places, and makes a wonderful display with its large pale purplish-blue or sometimes white flowers. *Tricuspidaria lanceolata*, from the Island of Chiloe, Valdivia, etc., is a glorious shrub in many Irish gardens, bearing abundance of its large pendent scarlet flowers in early summer; it is evergreen as a rule, but in cold districts may lose some of its dark green lance-shaped leaves. *Podocarpus nubigena* is rare, but should be noted as suitable for mild sheltered districts, as also is *Lomatia ferruginea*, a graceful shrub with fern-like leaves, green above, with a rusty tomentum on the under surface.

From the Himalayas we have such Rhododendrons as arboreum, barbatum, cinnabarinum, Falconeri, fulgens, glaucum, triflorum, and the more tender *R. grande* and *R. Edgeworthii*, which flourish in the mild non-calcareous districts. It should be noted by intending planters that the large number of new species recently introduced from China bid fair to become beautiful additions to our Irish gardens. *Abelia triflora* is also noteworthy, forming immense bushes bearing sweet-scented flowers; it was first introduced to the Botanic Gardens, Glasnevin.

From New Zealand come the Pittosporums, handsome evergreens with mostly inconspicuous flowers; they are, however, distinct shrubs with ornamental leaves, and make beautiful specimens. The hardiest species are Buchanani, crassifolium, Colensoi, Ralphii, tenuifolium, and the Chinese sort, daphniphylloides. *Pittosporum Tobira* from Japan has the most showy flowers, which are white and fragrant. Olearias also from New Zealand are successful, the best species being avicenniaefolia, macrodonta nummularifolia, oleifolia, and stellulata, the latter being an Australian shrub. *O. Haastii* is well known, and flowers freely in early autumn. Shrubby Veronicas do remarkably well in many places and are useful evergreens, many with beautiful flowers. The best sorts are Haastii, Lewisii, salicifolia, Traversii, sub-alpina, and rakaiensis among the larger growers, while dwarfer species include such as Armstrongii, Bidwillii, Canterburyensis, cupressoides decumbens, epacridea, Hectori, and pimeleoides. About Howth and Killiney, near Dublin, a dwarf blue Veronica allied to Autumn Glory has become naturalised on railway embankments, etc. It is very hardy, and flowers profusely in summer and autumn. The white-flowered *Leptospermum scoparium* makes huge specimens in some districts, and is probably the hardiest species; but Chapmannii, Nairnii, Nicholii, and pink and red flowered varieties, are beautiful in mild localities, and are worth trying wherever there is tolerable shelter.

A noble New Zealand plant is *Cordyline indivisa*, which flourishes in many parts of Ireland. The huge leaves reach a length of 6 ft. or more, and are 6 ins. wide in the middle; the veins are orange-coloured, and a large specimen is one of the finest sights to be seen in any Irish garden. *Plagianthus betulinus* and *Plagianthus Lyalli* are interesting New Zealanders, the former becoming a small tree in time with slender branches, clothed in summer with rounded lobed leaves; the flowers are unimportant. The latter, now often called *Gaya Lyalli*, is a handsome shrub, flourishing nearly everywhere as a wall plant, but in many places as a bush in the open. It bears in early summer quantities of pure white flowers. In some gardens plantations of New Zealand flax are a feature, but probably the handsomest variety is *Phormium tenax atropurpureum*, with dark purplish green leaves, and in summer immense inflorescences of reddish-yellow flowers.

From Peru the two most notable shrubs in Irish gardens are *Desfontainea spinosa* and *Fabiana imbricata*, both handsome and attractive, the former with holly-like leaves and tubular reddish-yellow flowers, the latter with small heath-like leaves and white flowers. *Carpentaria californica* is a beautiful shrub, quite hardy, and most attractive when bearing its pure white flowers. Cold winds in winter and spring are its chief enemy, and a position should be chosen for it accordingly. Ceanothuses do well as a rule, though some suffered severely during the winter and spring of 1916–17. The evergreen section is susceptible to harsh spring winds, but when species such as *Ceanothus rigidus* and *Ceanothus papillosus* survived and continued to flourish in the vicinity of Dublin, it is obvious that the genus is suitable for planting in Ireland. The deciduous autumn-flowering kinds do well, and annually make a great show. Camellias are amongst the best evergreens for Irish gardens, and are ornamental at all times. *Camellia japonica* and its varieties, latifolia, Donckelaarii, etc., are far too seldom seen outside, considering their merits as flowering and foliage shrubs. *Camellia cuspidata*, with narrow long-pointed leaves, makes a neat and attractive bush, which bears pure white flowers.

Other shrubs and trees typical of Irish gardens are Coprosmas, *Fagus antarctica*, *Fagus betuloides*, *Fagus obliqua*, *Solanum crispum*, *Arbutus Menziesii*; and the common Strawberry Tree, *Arbutus Unedo*, *Fendlera rupicola*, Escallonias, the tree heaths (*Erica arborea*, *Erica lusitanica*, etc.), and Bamboos flourish in many places. Californian and Mexican Pines are good in many localities, and several species of Eucalyptus are generally hardy.

Herbaceous and Alpine Plants.—All the best plants of the herbaceous border and the rock garden do well in Ireland with reasonable treatment, and in the vicinity of Dublin and elsewhere there are numerous herbaceous borders of great beauty. Scattered over the country there are many rock gardens rivalling in extent and number of plants the best to be found in Britain. In the deep soil of County Meath, although the climate is cold, herbaceous plants do exceptionally well, and assume a colour more intense and pure than in many places.

It is difficult, however, to point to any herbaceous or Alpine plants peculiarly suited to Ireland as opposed to other parts of the kingdom. The majority of them grow vigorously when reasonably treated by skilled gardeners; but in some cases winter damp has a disastrous effect, especially on Alpines from high altitudes, many Androsaces, Saxifrages, and other plants with hairy leaves perishing in winter unless planted in crevices or on a sharp slope where they can be protected from overhead moisture.

Nevertheless, the moisture-loving species of Meconopsis, Primula, etc., do remarkably well, especially in the North, and should certainly be made a feature, since they are perfectly hardy as far as cold is concerned. In the comparatively cool climate of County Antrim magnificent groups and specimens are to be seen annually of such good plants as *Primula bulleyana*, as well as others, such as *P. Beesiana*, *P. Littoniana*, *P. pulverulenta*, *P. sikkimensis*, all of which attain larger dimensions than are usual elsewhere; and the same is true of *Meconopsis aculeata*, and other species of this plant, such as *M. integrifolia*, *M. Wallichii*, etc. It is noteworthy, too, that these and similar plants seed profusely in the same locality. Generally speaking, the North seems well suited to the growth of plants from high altitudes.

It is impossible within the limits of this article to mention a tithe of the plants successfully grown in Ireland, but any one beginning to furnish a garden will do well to commence with the hardier kinds first; then with experience of the soil and climate of the district it is very probable many more tender plants may subsequently be added. For fruit growing many of the limestone districts are equal to Kent, except for Pears.—J. W. B.

IRISH IVY (*Hedera Helix canariensis*). See *CLIMBING AND TRAILING PLANTS*.

IRISH JUNIPER (*Juniperus communis fastigiata*).—See *TREES*.

IRISH POLYPODY (*Polypodium vulgare semilacerum*).—See *FERNS AND FERN GARDENING*.

IRISH SPURGE (*Euphorbia hyberna*) See *EUPHORBIA*.

IRISH YEW (*Taxus baccata fastigiata*).—See *TREES*.

IRON AND IRON COMPOUNDS.

Gardeners with very few exceptions fail absolutely to realise the importance and the need of iron or iron compounds for plant-food. This failure of recognition is because iron is what is called a secondary fertiliser ; in other words, it is not brought before gardeners nearly so much as are the usual fertilisers, nitrate of soda, sulphate of ammonia, superphosphate, and so on, which are in almost daily use during the summer months. But it has been neglected too long. Recent experiments have served to show that iron is a fertiliser of no small importance, and that while in large quantities it may prove detrimental or even poisonous to plant-life, in small quantities it produces remarkable results.

Research has shown that iron is the primary need of all green leaves of plants. If there is not enough iron in the soil the colour of the leaves will be pale, and that of the flowers will be poor in extreme, while in some cases it will be of an entirely different nature. This is shown by the effect iron has on Hydrangeas. It will turn a pink or white hydrangea into blue, and this fact is, of course, frequently taken advantage of, the plants being watered with a weak solution of some iron salt occasionally as the flowers open and so they become blue. When iron is given to any kind of flowers their colour is deepened, and it is probable that if we knew more about its use, we should be able to change the colour of many of our flowers to the type colours or something near them.

Experiments with Iron.—Instead of dealing with Iron Compounds under separate headings as we have done under Potash and Soda, we propose to speak about them collectively. But before proceeding to do this we want first to mention the enormous value of experiments with iron. Unfortunately up to the time this article was written but few experiments of any practical value have been made.[1] What is wanted is initiative in this direction, and initiative not only on the part of those in charge of Horticultural Colleges and Experimental Stations, but on the part of every man who calls himself a gardener. Such experiments should be commenced without delay, for they may take some years to complete, and efforts should be made to determine exactly the effects, good or bad, of various compounds of iron on the chief flowers and vegetables. There are some who may not like to take on this Herculean task; they may not have facilities for doing the large amount of accurate testing, and making the enormous number of observations necessary to complete the work. But if they cannot do it all, they can at least do a small part of it, such as, for instance, the taking of one compound of iron and the testing of its effects. Such results as are obtained ought to be communicated not to the Scientific Press, which no practical gardener ever reads, but to the popular gardening papers which are usually sharp enough to realise the value of any article showing original work, and will pay often generously for exclusive publication rights.

A point of importance when dealing with many iron salts is to keep them before use in tightly corked bottles or air-tight tins. Some of them change very rapidly when exposed to the air, and lose much of their value, becoming in many instances very dangerous to plant life. As a general rule, soils of a very light almost white sandy colour, such as abound around Bournemouth, and, in fact, in many parts of the country where the tertiary sands prevail, need iron much more than strong dark soils, but there are some striking exceptions to this rule. Take, for instance, the strong Jurassic clays so abundant round Scarborough, or indeed so abundant right through the belt of Jurassic rocks which runs across England. These clays are often dark enough in colour, so is the soil, yet the bricks produced from them are yellow not red, a sure sign of the absence of iron. These soils need dressing with iron; if they were, the crops produced would probably be much better both as regards quantity and quality—for it has been shown that iron influences and increases quantity.

---

[1] The experiments that have been made, such as they are, are of but little practical value, since they are never reported in language understood by gardeners who have not studied any Chemistry. The kind of information given may be useful enough to scientists, but it is Double Dutch to ordinary gardeners.—EDITOR.

Some Iron Compounds.—If we treat iron compounds collectively instead of alphabetically, we may say that SULPHATE OF IRON (*Ferrous Sulphate*, $FeSO_4 . H_2O$), or GREEN VITRIOL as it is called, is probably the most useful soluble salt. One ounce of this can be dissolved in 4 gallons of water, and the plants given a good soaking of this. It is useful for many crops and most flowers. In the winter, 1 oz. of this can be put on to each square yard and dug in. This chemical is an ingredient of very many lawn sands, as in large quantities it burns and completely kills weeds. Then there is iron itself. This is usually applied to the ground in the form of dust or filings, sometimes mixed with leather dust. Its use so far is in an experimental stage, as is also the use of iron oxide (*Ferric Oxide*, Fe_2O_3). As regards the latter, soils in iron-stone districts often contain more than enough of it, and sometimes such soils are poor in product as they are "too irony." Many things have been recommended as a dressing for such soils, the chief of which are gypsum and lime. Iron ammonia sulphate (or *Ferrous Ammonium Sulphate*, $Fe SO_4 . (NH_4)_2SO_4 . 6H_2O$) can be used similarly to green vitriol or sulphate of iron. It is a much more stable chemical and does not spoil itself so readily.

Reference must also be made to other compounds of iron, namely, the phosphates, sulphides, chlorides, and nitrates of this metal. These chemicals, such as they are, may be said to be in an absolutely experimental stage up to the present, so there is plenty of work waiting for any one who cares to commence experiments with the compounds of iron.—E. T. E.

See also *CHEMISTRY FOR GARDENERS*.

IRON WEED.—See *VERNONIA*.

IRONWOOD (*Ostrya virginica*).—See *TREES*.

ISATIS (WOAD. Nat. Ord. Cruciferæ).—Only two species of this genus are really worth growing, and both are hardy biennials. These, *Isatis glauca* and *I. tinctoria* (the last is the well-known WOAD or DYER'S WOAD), both bear yellow flowers in July. The first grows only 2 ft. high, but the other often grows 1 yd. or more high. Both succeed in ordinary garden soil, and need very little care or attention, as they practically grow wild. Propagation by seeds sown in the usual way is not at all difficult, and planting may be successfully carried out from October to March.

ISNARDIA.—Now included in the genus *LUDWIGIA*.

ISOLEPSIS.—Now included in the genus *SCIRPUS.*

ISOSOMA. — See CATTLEYA FLY in *INSECT PESTS.*

ITALIAN GARDENING.

To those who admire the formal style, the Italian garden makes a strong appeal. In carrying out the scheme in the United Kingdom the designer is faced by certain difficulties. The southern climate of Italy makes it possible to grow many striking subjects which are too tender to flourish in our northern islands. Still, by a careful selection, it is possible to find many plants giving the needful beauty of form.

In the typical Italian garden much attention is paid to making the grounds harmonise with the house. Even when dealing with the smallest villa each feature of the garden is considered in its relation to the residence, and the views which are obtained from the windows. Formal beds of rigid geometric design predominate, and these are always filled with the most gorgeous flowers. Sculpture, balustrades, sundials, and stone seats are freely employed. No Italian garden is complete without a terrace; there is always a fountain too, and, quite likely, a cascade. Alleys of trees, preferably those with dark evergreen foliage, such as the cypress, are considered essential features. With such skill are the different parts of the garden arranged, that the formality never gives the impression of stiffness.

In many old English houses more or less successful attempts at this kind of gardening have been carried out. Those who wish to introduce the style into their own grounds would find it worth while paying a visit to any such garden that may be within reach. In this way it is easy to grasp the adaptations needful for carrying out the scheme in Britain. The geometric beds are usually bordered with box, and the intersecting paths are often paved. In the beds themselves a constant succession of the most brilliant flowering plants must be maintained from the spring to the fall. Compact bushes of bay and other evergreens, often in tubs, must in England take the place of the orange and lemon trees of Italy. Agaves in pots should be freely used in the summer, or, as permanent subjects, yuccas will be found to be of great value. The British gardener misses the lawn in the Italian design, but its absence is in keeping with the style. On the sun-baked hillsides of the southern peninsula the formation of a grass lawn is almost impossible. In more recent times a charming effect has been secured in the spring and early summer by the annual sowing of grass seed, intermixed with the seeds of poppies, cornflowers, and similar subjects. The gay colours of the flowers stand up in fine contrast to the bright green of the grass, and a most striking effect is secured.

Useful plants with striking foliage for the Italian garden include Acanthus, Aralia, hardy Bamboos, Cordyline, Gunnera, New Zealand Flax (*Phormium*), Tree Mallow (*Lavatera*), hardy Palm (*Chamaerops*), and Yuccas. Most of these subjects are fairly hardy in Britain. For the summer months more tender plants could be placed out of doors. The American Aloes (*Agave*), Bananas, Tree Ferns, and many of the Palms specially help in securing a striking Italian effect.

S. L. B.

ITALIAN HYACINTHS.—See ROMAN AND ITALIAN HYACINTHS in *HYACINTH.*

ITALIAN MAPLE (*Acer opulifolium*).—See *TREES.*

ITALIAN MILLET (*Setaria italica*).—See *SETARIA.*

ITALIAN OAK (*Quercus Esculus*).—See *TREES.*

ITALIAN RYE GRASS (*Lolium multiflorum*).—See *LOLIUM.*

ITALIAN SNAPDRAGON (*Antirrhinum Asarina*). — See *ANTIRRHINUM: ROCK GARDEN SPECIES.*

ITALIAN STARWORT (*Aster Amellus*).—See *ASTER.*

ITEA.—For best species see *SHRUBS.*

IVESIA.—Now included in the genus *POTENTILLA.*

IVIES.—See HEDERA in *CLIMBING AND TRAILING PLANTS.*

IVORY DUST.—See "Hoof Parings" in our notes on ORGANIC PRODUCTS under NITROGENOUS MANURES in *MANURES.*

IVORY MILK THISTLE (*Silybum eburneum*).—See *SILYBUM.*

IVY.—For best kinds see HEDERA in *CLIMBING AND TRAILING PLANTS.*

IVY-LIKE MORNING GLORY (*Ipomoea hederacea*).—See *CLIMBING AND TRAILING PLANTS.*

IXIA LILY.—See *IXIOLIRION.*

IXIAS (Nat. Ord. Iridaceæ).

These are pretty, hardy bulbs, with brightly coloured, star-shaped blooms. They have narrow, Gladiolus-like leaves, and bear their flowers in spring on slender spikes about 12–15 ins. in height.

Culture. — Ixias like a warm, sunny border, with light, rich, sandy soil. They should be planted in September or October about 4 ins. deep. They make excellent pot plants. Five or six bulbs in a 4½-inch pot make a good display. They resent much heat, a winter temperature of from 40–50° F. being sufficient. The flowers are much brighter in colour when the plants are grown "cool."

Species and Varieties.—*Ixia azurea.*—Azure blue, with maroon centre.

I. Bridesmaid. — White flowers, with crimson eye.

I. Bucephalus. — A rosy-carmine variety, good in pots.

I. crateroides.—A brilliant cerise-scarlet variety, fine for cutting and for pot culture.

I. Emperor of China.—Yellow, with black eyes.

I. Excelsior.—A large-flowered variety, with crimson-scarlet blooms.

I. Linaresii. — Bright lilac-blue flowers.

I. Queen of Roses.—Rose.

I. Snowflake.—Pure white.

I. viridiflora.—This bears sea-green flowers, with a dark, almost black, centre; it is quite unique, and is splendid in pots.

I. White Swan. — White, with indigo eye.—J. J. & E. T. E.

IXIOLIRION (IXIA LILY. Nat. Ord. Amaryllidaceæ).—This is a small bulbous genus, allied to the *ALSTROEMERIA*, on which a separate article is given, and is included because its bluish-lilac flowers are so useful for vase decoration. In all but the colder parts of the British Isles it is hardy in light, well-drained soil, in warm, sunny positions.

Culture.—The bulbs should be planted in the autumn about 2 ins. deep, and protected with some light substance during the winter. This should be removed in February or early March, according to the season. When the foliage has died down, the bulbs should be lifted and stored until planting time. Ixiolirions may be grown in pots if they can be wintered in a frost-proof frame, and brought into a cool greenhouse about the middle of February.

Species and Varieties.—The best are:—

Ixiolirion Pallasii.—This bears pale lilac-blue flowers in umbels in early June. Height, 1–1½ ft.

I. tartaricum (more correctly *I. montanum tartaricum*).—This is similar to the above, but has smaller and more numerous flowers in the umbel. It flowers in the open in June, and grows 12–18 ins. in height.

J. J. & E. T. E.

J

JACK-IN-PRISON or JACK-IN-THE-GREEN.—See *LOVE-IN-A-MIST.*

JACKMAN'S CLEMATIS (*Clematis Jackmani*).— See *CLIMBING AND TRAILING PLANTS.*

JACOB'S LADDER. — See *POLEMONIUM.*

JACOBAEA.—A synonym for *SENECIO*, which see.

JAMESIA.—For the best species see *SHRUBS.*

JANKAEA.— Now included in the genus *RAMONDIA.*

JAPAN HONEYSUCKLE (*Lonicera japonica*).— See *CLIMBING AND TRAILING PLANTS.*

JAPAN PINKS (*Dianthus chinensis*).—See *INDIAN PINKS AND JAPAN PINKS.*

JAPAN QUINCE (*Cydonia japonica*). See *CLIMBING AND TRAILING PLANTS* and *SHRUBS.*

JAPAN SPINDLE TREE (*Euonymus japonicus*).— See *CLIMBING AND TRAILING PLANTS.*

JAPANESE ANEMONE.— A name applied to *Anemone japonica.*

JAPANESE APRICOT (*Prunus Mume*). See *TREES.*

JAPANESE ARBOR VITAE (*Thuya japonica*).—See *TREES.*

JAPANESE ARTICHOKE. — A synonym for *CHINESE ARTICHOKE*, which see.

JAPANESE BLACK PINE (*Pinus Thunbergii*).—See *TREES.*

JAPANESE CEDAR (*Cryptomeria japonica*).—See *TREES.*

JAPANESE CHESTNUT (*Castanea crenata*).—See *TREES.*

JAPANESE CHRYSANTHEMUM.—See under INDOOR or LATE FLOWERING VARIETIES in *CHRYSANTHEMUMS : CULTIVATION OF.*

JAPANESE CUCUMBERS. — See *CUCUMBERS, OUTDOOR.*

JAPANESE CYPRESS RETINOSPORA (*Cupressus obtusa*).— See *TREES.*

JAPANESE GARDENING.

Interesting adaptations of the Japanese style of gardening are often to be seen nowadays. In the Land of the Rising Sun the laying out of a garden is controlled by certain fixed laws which are only partially understood by Westerners. Still, some delightful effects can be secured by following the leading rules on which the Japanese gardener works.

A Japanese garden makes a strong appeal to the amateur on account of the fact that it can be developed on a very small plot of ground. In planning, one of the most important points is to consider the effect of the garden as a whole. Every plant, and each piece of rockwork, must be thought of in its relation to the general scheme. All parts of the garden must be true to their particular characters. Any elevations, such as may exist or be built up, will be suggestive of mountainous country, and the plants must be in keeping with the idea. Dwarf or stunted trees and shrubs give a windswept appearance, and are well adapted to the hilly parts of the garden. Low, flat areas of ground give the impression of pasture, and should be planted with subjects having a free habit of growth.

No Japanese garden is complete without water. This may be in the form of quite a tiny pool, but if a stiff outline is avoided the pond will be one of the most attractive features. On the banks of the water moisture-loving plants can be allowed a freedom of growth that is natural in such situations. If possible the placing of a small island in the pool is to be recommended. Where the water can be narrowed down to give the effect of a stream, a bridge might be introduced. In situations where there is a natural supply of water more ambitious schemes may be attempted.

Native Japanese plants should predominate in the garden. Especially suitable are the spring flowering trees so widely used in the East, such as the almond, cherry, crab-apple, etc. These will usher in the spring with a wonderful wealth of blossom. Azaleas are useful for giving fine splashes of colour in the early summer, whilst wistaria should be freely used for training over pergolas. Japanese

Irises should of course be made a great feature of in the garden, and a selection of chrysanthemums will give a good effect in the fall. A useful small tree is the Japanese Maple, of which there are numerous varieties. Most of these provide splendid autumn tints just when there is a need of colour.

Other interesting plants which are very suitable for, if not inseparable from, Japanese gardens include *Anemone japonica*, *Forsythia suspensa*, Japanese Heaths, Japanese Lilies, Paeonies, *Physalis Alkekengi*, *Primula japonica*, and *Tricyrtis hirta*.

S. L. B.

JAPANESE HEMLOCK FIR or JAPANESE HEMLOCK SPRUCE (*Tsuga Sieboldi*).—See *TREES*.

JAPANESE LARCH (*Larix leptolepis*). See *TREES*.

JAPANESE MOON-WORT. — See *SCHIZOCODON*.

JAPANESE MOUNTAIN HEMLOCK (*Tsuga diversifolia*).[1]—See *TREES*.

JAPANESE OAK (*Quercus glabra*).—See *TREES*.

JAPANESE PLUM (*Prunus triflora*).—See *TREES*.

JAPANESE QUINCE (*Cydonia japonica*).—See *CLIMBING AND TRAILING PLANTS* and *SHRUBS*.

JAPANESE ROSE (*Rosa rugosa*).—See *ROSE SPECIES*.

JAPANESE SILVER FIR (*Abies firma*). See *TREES*.

JAPANESE THUYA (*Thuya dolabrata*).—See *TREES*.

JAPANESE TORREYA (*Torreya nucifera*).—See *TREES*.

JAPANESE WINDFLOWER. — A name for *Anemone japonica*.

JAPANESE WISTARIA (*Wistaria japonica*).— See *CLIMBING AND TRAILING PLANTS*.

JAPANESE YEW.—A name applied to the genus CEPHALOTAXUS and to *Taxus cuspidata*. See *TREES*.

JASIONE (SHEEP'S SCABIOUS.[2] Nat. Ord. Campanulaceæ).—The comparatively unknown genus Jasione includes one hardy annual of fair merit for use in the rock garden. This (*Jasione montana*) is a pale blue, June flowering subject, growing about 8 ins. high. Sow seeds of it outdoors in March where the plants are to grow, and thin out, as soon as large enough, to 6 ins. apart each way.

Perennial Border Species.—These are suitable for the herbaceous border or rock garden. Provided they are not set in a fully exposed place, and are afforded some light, loamy soil they should do well. Propagation is best effected by seeds sown in the usual way or by the usual division of the roots in the spring. The three useful species are *Jasione foliosa*, *J. humilis*, and *J. perennis*. All bear blue flowers in June and July. The first and last are about 12 ins. high; *Jasione humilis* rarely exceeds 6 ins. however.

JASMINE PLANT.—A name applied to *BOUVARDIA*, which see.

JASMINUM.—For the best species see *CLIMBING AND TRAILING PLANTS*.

JEFFERSONIA (Nat. Ord. Berberidaceæ).—Only one species of this genus is commonly grown. This, *J. binata* (Syn. *J. diphylla*), is a little hardy herbaceous perennial suitable for edgings and margins to borders or for the rock garden. It bears white flowers in May, succeeds in light sandy soil in a sunny site, is propagated by seeds sown in the summer, or by division of the roots in the spring, and grows about 6 ins. high.

JERSEY ELM (*Ulmus campestris sarniensis*).—See *TREES*.

JERUSALEM ARTICHOKES. — See *ARTICHOKE*.

JERUSALEM CROSS (*Lychnis chalcedonica*).—See *LYCHNIS*.

JERUSALEM OAK (*Teucrium Botrys*). See *TEUCRIUM*.

JERUSALEM PINE (*Pinus halepensis*).—See *TREES*.

---

[1] The Kew Authorities refer it to *Tsuga Sieboldi*.—EDITOR.

[2] Or SHEEP'S-BIT SCABIOUS. — EDITOR.

JERUSALEM SAGE (*Phlomis fruticosa*).—See *PHLOMIS*. See also the genus PHLOMIS in *SHRUBS*.

JESSAMINE (*Jasminum officinale*).—See *CLIMBING AND TRAILING PLANTS*.

JESSAMINE POTATO TREE (*Solanum jasminoides*).—See *CLIMBING AND TRAILING PLANTS*.

JEW'S MALLOW.—The genus KERRIA. See *SHRUBS*.

JOB'S TEARS (*Coix Lacryma-Jobi*).—See *COIX* and *ORNAMENTAL GRASSES*.

JOBBING GARDENING: OPENINGS FOR WOMEN IN. — See *WOMEN GARDENERS*.

JONIRIS.— Now included in the genus *IRIS*.

JONQUILLA.— Now included in the genus *NARCISSUS*.

JONQUILS (*Narcissus Jonquilla*. Nat. Ord. Amaryllidaceæ). — These are not as much grown now as formerly, but are worthy of inclusion in the garden or greenhouse for the dual reason of the loveliness of their flowers and for the pleasantness of the scent they give.

Culture.—This is quite simple. Outside the bulbs should be planted about three times their own depth in soil, preferably in groups. They may be used for naturalising, and may be planted in the rock garden or rock border as well as in the flower borders. Indoors four should be set in each 5-inch pot, using light loamy soil, and giving plenty of water when the flowers open.

Varieties.—No special variety or varieties can be recommended here. The plants bear yellow flowers in the spring-time, and average 9 ins. in height.

[For the flower known as QUEEN ANNE'S DOUBLE JONQUIL and the SMALL JONQUIL see *Narcissus Odorus* in *NARCISSUS SPECIES*.—EDITOR.]

JUDAS TREE.—A name applied to the genus CERCIS, more especially to *C. Siliquastrum*. See *TREES*.

JUGLANS.—For the best species see *TREES*.

JULIDÆ.—See MILLEPEDES in *INSECT PESTS*.

JUNCUS (RUSH. Nat. Ord. Juncaceæ).—Most of the Rushes are too coarse for the water garden proper, but may be used for planting on stream or river sides, or, again, in the wetter and more marshy portions of the wild garden where they will thrive with very little attention. The genus is a large one, and as the plants are of but little value we do not propose to describe the species here, but merely to name the kinds most often grown. These are the TOAD RUSH (*J. bufonius*); the CANDLE RUSH (*J. effusus*, and its varieties *conglomeratus* and *spiralis*); the COMMON HARD RUSH (*J. glaucus*) used for basket making; and the MOSS RUSH (*J. squarrosus*).

JUNE BERRY or **JUNE-BERRY.**—A name applied to the genus AMELANCHIER, more especially to *A. canadensis*. See *SHRUBS*.

JUNE BUG and **JUNE BUG MAGGOT.** See under CHAFERS in *INSECT PESTS*.

JUNIPER.—See *MEDICINAL HERBS*, and see under JUNIPERUS in *TREES*.

JUNIPERUS.—For the best species see *TREES*. See also JUNIPER in *MEDICINAL HERBS*.

JUPITER'S DISTAFF (*Salvia glutinosa*).—See *SALVIA*.

K

KAFFIR LILY (*Schizostylis coccinea.* Nat. Ord. Iridaceæ).—This, also known as the CAFFRE LILY, CRIMSON FLAG, or WINTER GLADIOLUS, is a hardy rhizomatous-rooted plant introduced into British gardens in 1869. It has sword-like foliage, and bears on slender stems, averaging 1½–2½ ft. high, numerous bright crimson saucer-shaped flowers in October and early November. These spikes are excellent for cutting, the unopened buds expanding in water like those of the Gladiolus. It is hardy except in cold damp soils and exposed localities.

Culture.—To be seen at its best it should be grown in clumps in a warm, rich, well-drained soil; but not in one which is hot and dry, and a top-dressing of leaf-mould after the flowers are over will greatly benefit the plants. The bulbs may be planted any time between September and March.

The Kaffir Lily may be grown in pots in light rich soil. After potting in March, the pots are best plunged in the ground all summer and only brought into a greenhouse in late September or early October, when the flower spikes are appearing. Frequent watering is necessary, also repotting in March or April, when severe frosts have gone, after which the pots should be again plunged for the summer in the open ground.

J. J. & E. T. E.

KAINIT.—See under POTASH MANURES in *MANURES*, and see also *MAGNESIA AND MAGNESIUM COMPOUNDS*.

KAKI (*Diospyros Kaki*).—See *TREES*.

KALE.—See *BORECOLE or KALE*, *CRAMBE*, and *SEAKALE*.

KALMIA.—For the best species see *SHRUBS*.

KANSAS GAY FEATHER (*Liatris pycnostachya*).—See *LIATRIS*.

KAULFUSSIA.—A synonym for CHARIEIS. See *CAPE ASTER*.

KEAKI (*Zelkova acuminata*).—See *TREES*.

KELP.—See under BURNING SEAWEED in *SEAWEED AS MANURE*.

KENTIA.—See under HOWEA in *PALMS*.

KENTISH BALSAM (*Mercurialis perennis*).—See *MERCURIALIS*.

KENTISH COB.—A variety of COBNUT. See COBNUT, FILBERT, AND HAZEL in *NUT CULTURE*.

KERMES OAK (*Quercus coccifera*).—See *TREES*.

KERNERA.—Now included in the genus COCHLEARIA.

KERRIA.—For the best species see *CLIMBING AND TRAILING PLANTS* and *SHRUBS*.

KIDNEY VETCH.—A name applied to *ANTHYLLIS*, which see.

KILLARNEY FERN (*Trichomanes radicans*).—See *FERNS AND FERN GARDENING*.

KINDS OF CROPS.

Every gardener is aware that there are four chief classes in the vegetable kingdom—flowers, fruit, fungi, and vegetables—but he is in most cases uncertain as to the precise meaning of such terms as Brassica Family, Bulbous Crops, Bush Fruits, Cabbage Tribe, Catch Crops, Culinary Crops, Gross-Feeding Crops, Hard Fruits, Headed Crops, Leaf Crops, Leguminous Crops, Onion Tribe, Rhizomatous Plants, Root Crops, Saladings, Seed Crops, Small Fruits, Soft Fruits, Surface Crops, Tap-Rooted Crops, Tuberous-Rooted Crops, Turnip-Rooted Crops, Umbelliferous Crops, etc. We thus propose to explain these terms in the present article:—

Brassica Family.—This includes all plants of the Cabbage Tribe, most turnip-rooted crops, and some others.

Bulbous Crops. — These have bulbous roots and are much like bulbs. Leeks, Spring Onions, Potato Onions, and Shallots are all of this kind. They must be distinguished from turnip-rooted crops, and this is easy, for a bulb is made up of scales which can be removed one by one, and this is not the case in a turnip-rooted crop.

Bush Fruits. — These include Black, Red, and White Currants, Gooseberrries, Loganberries, and Raspberries. Strawberries are sometimes included under the same heading. It may be applied to smaller bushes of Apples, Pears, and Plums as well.

Cabbage Tribe. — Strictly this consists only of plants of the Brassica Family, of which the leaves or heads are used as food. These include Borecole, Broccoli, Brussels Sprouts, Cabbage, Cauliflower, Chinese Cabbage, Chou de Burghley, Couve Tronchuda, Curled Greens, Kale, May Greens, Savoys, Winter Greens, etc.

Catch Crops.—These are used for growing between more permanent crops, or on ground not vacant for more than a month or two. They include Corn Salad, Endive, Lettuce, Radish, Spinach, etc. Mustard, Rye, Vetches, etc., are sometimes used as catch crops for digging-in purposes.

Culinary Crops.—By these is meant any crop which has to be cooked before use. Thus all the important vegetables are culinary crops, but saladings (eaten raw) are not.

Gross-Feeding Crops. — These are crops which like a lot of dung and thus need heavily manured land. The three most important are Cauliflowers, Celery, and Onions. Leeks are also gross feeders.

Hard Fruits.—Apples and Pears are the chief of these, but the term is applied to any fruits of which the flesh or peel is reasonably hard. Vegetable Marrows (if fruits at all) would be considered as hard fruits, and the same applies to Cucumbers, Melons, etc.

Headed Crops.—This term is by some confined to such crops as Borecole, Brussels Sprouts, Curled Greens, and Kale, which make a definite "head" at the top of the plant. Other gardeners, however, talk about heads of Asparagus, heads of Broccoli, Cabbage, Cauliflower, and Savoy, so the term is rather wide and vague.

Leaf Crops.—By these is meant any crop of whatever kind it may be that is used for its leaves. A few of the large number include Borecole, Brussels Sprouts, Cabbage, Chinese Cabbage, Corn Salad, Couve Tronchuda, Curled Greens, Endive, Kale, Lettuce, Nasturtiums, Savoy Cabbage, Seakale, Seakale Beet, Spinach, Spinach Beet, and Winter Greens.

Leguminous Crops.—All these belong to the Natural Order Leguminosæ, and have the power of utilising the nitrogen of the air to form nitrates. They include every sort of Bean and Pea that is grown in gardens.

Onion Tribe.—By this is meant all the crops belonging to the genus *Allium*. Chives, Garlic, Leeks, Onions, Potato Onions, and Shallots are the chief crops concerned.

Pea Tribe.—This term is loosely used to include all leguminous crops, but it should be abandoned.

Rhizomatous Plants.—By this is meant any crop possessing a swollen surface stem or root just under the soil. The best example is a flower—the Iris—used in medicine. Readers will be able to find other plants coming under this category if they observe closely.

Root Crops.—This term is very comprehensive, including as it does all tap- and turnip-rooted crops. More often it is used for the former than the latter. Sometimes gardeners include in it bulbous crops, but this is quite inadmissible.

Saladings.—These are usually considered to include the smaller leaf and root crops which are eaten raw, such as Corn Salad, Endive, Lettuce, Nasturtium, Mustard and Cress, Purslane, Radish, etc. Cucumbers and Tomatoes, often forming an addition to the salad bowl, are not usually considered Saladings however.

Seed Crops.—In gardening, by this term we mean crops which are grown for their seeds which are eaten. These include Beans of all kinds; Indian Sugar Corn or Maize, and Peas of all kinds. The Marrow and Tomato are grown for their fruits and not for their seeds, and are thus excluded from Seed Crops.

Small Fruits.—This term often means the same as the term Bush Fruits, already explained. More often we mean small bushes of Apples, Apricots, Cherries, Peaches, Pears, and Plums, when we talk about Small Fruits.

Soft Fruits.—All fruits of which the flesh, skin, or peel is not hard is the best explanation of this term.

Surface Crops.—These are an opposite kind of crop to Root Crops; whereas the latter root downwards for some depth, Surface Crops root within a few inches of the surface and thus they need much more watering. The most important surface crops are the Saladings, of which we have already given a list.

Tap-Rooted Crops.—These have a long tap-root. At present all the turnip-rooted crops given in the next paragraph but one are included, but gardeners should distinguish the latter class as they need more surface cultivation than do the strictly tap-rooted crops, which are as follows: Beetroot (long), Carrots, Parsnips, Salsafy, and Scorzonera.

Tuberous-Rooted Crops.—Although botanists disagree, the following are considered tuberous-rooted crops by the gardener: Artichokes, Chinese Artichokes, Potatoes, and Potato Onions. Some flowers are also tuberous rooted, as, for instance, one section of the Begonia and all the Dahlias.

Turnip-Rooted Crops.—This term is comprehensive, including as it does all crops having any resemblance in the shape of their roots to a turnip. These include Beetroot, (Globe Beet), Cardoons, Celeriac, Kohl Rabi, Radishes, Swedes, Turnips, and Turnip-Rooted Parsnips. Many of these are of the Brassica Family, but by no means all.

Umbelliferous Crops.—These belong to the Natural Order Umbelliferæ (hence their name), which order contains many poisonous plants. The chief useful crops included in this term are Carrots, Celeriac, Celery, Chervil, Fennel, Parsley, Parsnips, and Skirret.

Care must be taken not to use terms with no meaning, such as the Potato Family, meaning that group of tuberous crops including the Potato, and so on.—E.

KINDS OF ROCKS.—See *Garden Geology.*

KINDS OF SCENERY.—See *Landscape Gardening.*

KING OF THE BLUEBOTTLES (*Centaurea depressa*).—See *Cornflower.*

KING OF MALE FERNS (*Nephrodium Filix-mas pseudo-mas cristatum*).—See *Ferns and Fern Gardening.*

KING-NUT (*Carya sulcata*).— See *TREES*.

KING'S GARLAND FLOWER (*Daphne blagayana*).—See *SHRUBS*.

KINGSACRE-BERRY.—See *BRAMBLES AND BERRIES*.

KINNIKINNIK (*Cornus Amomum*).—See *SHRUBS*.

KIRI (*Paulownia imperialis*). —See *TREES*.

KNAPWEED.—See *CENTAUREA*.

KNAUTIA.—Now included in the genus SCABIOSA. See *SCABIOUS*.

KNEIFFIA. — Now included in the genus ŒNOTHERA.

KNIPHOFIA (Syn. *Tritoma*. RED-HOT POKER, TORCH LILY, etc. Nat. Ord. Liliaceæ).—The Kniphofias are probably among the most brilliant of all hardy herbaceous perennials, and are of extraordinary value for all garden purposes. For making a splash of colour against the more sombre background of shrubs they are invaluable, but are too good as a rule for use in the wild garden. The smaller sorts prove striking features in the front portions of perennial borders, mixed borders, etc., while the taller species are grand for the back rows of the same borders.

Culture is not a matter of much difficulty. The plants succeed in ordinary light, rich, sandy soil in a sunny or lightly shaded site, and are propagated by division of the rootstock in the spring or by means of slipping off suckers from the rootstocks. In very exposed districts it is advisable to lift and winter in a frame, or to cover the roots with leaf-mould, cocoanut fibre refuse, etc., to keep them warm. Early and efficient staking is essential if the taller sorts are to be grown successfully.

What to Grow. — An enormous number of species and hybrids have been described. We recommend the following :—

Kniphofia aloides (RED-HOT POKER). — This is the well-known species, and a great favourite. It produces glorious flame-coloured flowers from June to October, on plants 3–8 ft. high. Among the best forms derived from this, flowering at the same time and of similar height, are: *Egypt* (sulphur-yellow); *Empress* (bright scarlet); *grandiflora* (brilliant flame and yellow); *Heroine* (yellow); *Ideal* (bright scarlet); *Leda* (orange-scarlet); *Maxima* (deep yellow); *Meteor* (rich dark yellow); *Nobilis* (rich orange); *Ophir* (orange-yellow); *Saundersi* (orange-scarlet); *Sirius* (bright reddish-orange); *Stella* (pale yellow); *Torchlight* (bright flame-colour); and *Triumph* (orange-yellow).

K. Burchellii.—This bears orange flowers in June, and grows 1½ ft. high.

K. foliosa.—This striking plant bears yellow flowers in August, but is not quite hardy. Its height is 3–4 ft.

K. Macowanii.—This also is not quite hardy, but is a splendid sort bearing richly red-tinted orange or flame-coloured flowers in August and September, on plants only 1½ ft. in height.

K. modesta.—This bears white flowers freely during the summer months, and averages 2 ft. in height.

K. Nelsoni.—This bears attractive bright orange or orange-vermilion flowers throughout the summer, and averages 2 ft. high.

K. Northiae.—This bears light yellow flowers, sometimes tinted red, from June onwards, and averages 5 ft. high.

K. Rooperi. — This sort bears bright orange or reddish-orange flowers in September, October, and November. It grows 3–4 ft. high.

K. sarmentosa.—This bears attractive orange flowers throughout the summer, and grows only 2 ft. in height.

K. Tuckii.—This is often offered by nurserymen as being a brilliant orange-red. It is, however, a disappointing sort as its colour rapidly fades and leaves a poor pale yellow. The plant blooms from June onwards, and averages 2–3 ft. high.

K. Uvaria.—This popular sort of the trade is now considered synonymous with *K. aloides.*

KNIVES.—See *GARDEN TOOLS.*

KNOHL-KHOLL.—A synonym for *KOHL RABI*, which see.

KNOT GRASS or KNOTGRASS.—See *ILLECEBRUM*, *POLYGONUM*, *WATER GARDEN: PLANTS FOR THE*, and *WEEDS.*

KNOT ROOT.—See *INSECT PESTS.*

KOCHIA (Nat. Ord. Chenopodiaceæ).—*K. trichophylla* of the seedsmen (now referred by some authorities to the variety *trichophylla* of the weed *K. scoparia*) is an annual well worth growing, forming compact little plants which are striking if used as dot subjects in summer bedding. The foliage of the plant is not much to look at until late August or early in September, when it becomes a brilliant bright red. The flowers borne from July onwards are greenish and are produced on plants about 2 ft. in height. The best way is to raise and treat as a half-hardy annual, but it may also be grown in pots for greenhouse or conservatory decorations.

KOELERIA (Nat. Ord. Gramineæ). This is a genus of hardy grasses of which several species are grown at Kew. In dry districts the species prove useful lawn grasses, but otherwise must be considered as weeds of no garden value. The two best known species are probably *K. albescens* and *K. phleoides*, and its variety *grandiflora* (Syn. *K. berythea*), all of which are popularly known by the name of CRESTED HAIR GRASS.

KOELREUTERIA.—For the best species see *TREES.*

KOHL RABI (*Brassica oleracea Caulo-rapa.* Nat. Ord. Cruciferæ).—This vegetable, so long regarded only as food for sheep or cattle, is now an established favourite in many gardens, especially in those districts where it is well-nigh impossible to secure palatable roots of white or yellow turnips. In appearance the roots of these are totally unlike anything else we cultivate, having an almost bulbous stem, of a turnip character, with a top suggesting one of the more coarse kinds of winter greens. To be really palatable it is important that growth be made very rapidly and the roots eaten in a young or half-grown state. If left to attain full size, these become coarse and hard, invariably proving most disappointing to gardener and cook alike. A great advantage these possess over turnips is, the roots bear drought remarkably well.

Culture.—Seed for an early crop may be sown very thinly in April, subsequent small sowings being made until July to secure roots for early winter supply. When sown in their permanent positions, reduce the seedlings while still small to about 3–4 ins. apart. This allows each alternate root to be withdrawn when these reach a usable size. Seedlings bear transplanting very well in the driest weather, provided they are well watered immediately.

Kohl Rabi may be left in the open ground all winter or be stored in pits or a cold shed, but wherever convenient the former is the better plan to adopt, ensuring plump roots of better quality.

Varieties.—The *Early Purple* and the *Early Green* are the best sorts to grow. The *Large Purple* and *Large Green* are usually too coarse.

F. R. C.

See also *ORNAMENTAL VEGETABLES.*

KONIGA.—Now included in the genus *ALYSSUM.*

KORO-MIKO (*Veronica parviflora*).—See *SHRUBS.*

KOROLKOWIA.—Now included in the genus FRITILLARIA. See *CROWN IMPERIAL* and *FRITILLARY.*

KORUMEEK (*Veronica salicifolia*).—See *SHRUBS.*

L

LABELS.—See article on *GARDEN LABELS.*

LABIA.—See EARWIGS in *INSECT PESTS.*

LABRADOR TEA.—The genus LEDUM and *L. latifolium.* See *SHRUBS.*

LABURNUM.—For the best species see *TREES.*

LACE BARK PINE (*Pinus bungeana*). See *TREES.*

LACEWING FLIES. — See *INSECT FRIENDS.*

LACHENALIA (Nat. Ord. Liliaceæ). Greenhouse bulbs, 6–12 ins. high, succeeding in good loam, peat, rotted cow manure, and sand in equal parts. They are propagated from offsets and by seed.

Culture.—The bulbs should be potted early, not later than the middle of August, six or seven bulbs in a 5-inch pot. Do not press the soil too firmly, and let the tops of the bulbs be half an inch beneath the surface. Place the pots in a cold frame till about the middle of November, when they should be brought into the greenhouse or conservatory. The plants like plenty of air, but should not be placed within reach of a draught. The temperature should be maintained about 50° F. during winter. February is the season of bloom. The more pendulous varieties are useful for hanging-baskets.

Varieties. — Brightness, Cawston Gem, His Reverence, Nelsoni, Rose Barton, Rosemary, Ruth Lane, and the species *L. luteola maculata* are very good.—J. L. G.

LACKEY MOTH.—See *INSECT PESTS.*

LACQUER TREE (*Rhus vernicifera*). See *SHRUBS.*

LACTUCA (Nat. Ord. Compositæ). The lettuce of our kitchen gardens and our salad bowls belongs to this genus and goes by one or other of the names *Lactuca sativa* and *L. Scariola.* The genus contains a few good border plants which are hardy perennials in habit, and are of importance where a representative collection is desired, otherwise they may be passed over. All those described below succeed in light rich garden soil in a sunny site, and can be propagated by division of the roots in the autumn or spring, at which times they may be successfully planted :—

Lactuca alpina (BLUE SOW-THISTLE).—This bears dark blue or purple-blue flowers from July onwards, and averages 1 yd. in height.

L. cretica.—This is a tall blue July blooming plant about 6 ft. high.

L. macrophylla.—This sort bears purple-pink flowers in July and August, on plants 3–4 ft. high.

L. Plumieiri.—This is a splendid sort bearing purple flowers from July to August, on plants 6 ft. high.

L. racemosa.—This is an attractive pale blue sort blooming from July to September, and growing 3–4 ft. high.

L. tuberosa.— This ornamental border plant is not included in the *Kew Hand-list*, but is well worth cultivating for its large blue flowers, which last are produced in September on plants 2 ft. high.

LAD'S LOVE.—See *ARTEMISIA.*

LADIES' BEDSTRAW (*Galium verum*). See *GALIUM.*

LADIES' FINGERS (*Anthyllis Vulneraria*).—See *ANTHYLLIS.*

LADIES' TRESSES (*Spiranthes autumnalis*). — See note at end of *HARDY ORCHIDS*.

LADY FERN (*Athyrium Filix-fœmina*). See *FERNS AND FERN GARDENING*.

LADY'S MANTLE.—See *ALCHEMILLA*.

LADY'S SLIPPER. — See *CYPRIPEDIUM*.

LADY'S SLIPPER ORCHIDS. — See CYPRIPEDIUM in *HARDY ORCHIDS*.

LADY'S SMOCK (*Cardamine pratensis*). See *CARDAMINE*.

LADYBIRDS.—See under BEETLES in *INSECT FRIENDS*.

LÆLIA.—See *ORCHIDS*.

LÆLIOCATTLEYA.—See *ORCHIDS*.

LAGURUS (Nat. Ord. Gramineæ). This is a genus of handsome ornamental grasses the best species of which, *L. ovatus*, popularly known as the HARE'S-TAIL GRASS, is described in our article on *ORNAMENTAL GRASSES*.

LAMARKIA (Nat. Ord. Gramineæ). This is a genus of hardy annual grasses. The best species, *L. aurea*, is referred to in our article on *ORNAMENTAL GRASSES*, which see.

LAMB'S LETTUCE.—See CORN SALAD in *SALAD PLANTS*, also *VALERIANELLA*.

LAMB'S-SKIN.—See *ARNICA*.

LAMBERT'S CYPRESS (*Cupressus macrocarpa*).—See *TREES*.

LAMIUM (DEAD NETTLE, Nat. Ord. Labiatæ).—This is a genus of nettle-like hardy herbaceous perennials, the leafage of which has no stinging properties. The species are of little garden value, though *L. maculatum* and its varieties *album*, *aureum*, and *rugosum* are sometimes grown in mixed or shrub borders. The type is purple; the varieties, however, bear white and reddish flowers respectively, the second having golden variegated foliage. All bloom from June to August, and average 12–18 ins. high. Another species of weedy appearance (*L. Galeobdolon*) is popularly known as the YELLOW ARCHANGEL, while a third (*L. purpureum*) is the troublesome RED DEAD NETTLE described in our article on *WEEDS*.

LAMPRONIA.—See RASPBERRY SHOOT BORER in *INSECT PESTS*.

LAND SCAB.—See COMMON SCAB in *POTATO DISEASES*.

LANDSCAPE GARDENING.

In Landscape Gardening one naturally seeks to attain "the beautiful," but it is not given to everyone to have the same tastes, or perception, as to the best means to attain it.

The senses by which we discover beauty are mostly sight and hearing, but in Landscape Gardening the latter is little exercised. With regard to the perception of beauty by the aid of sight, it is necessary to bear in mind that the whole matter is governed by lines, which may be either curved or straight, natural or artificial. The curved or serpentine line is indicative of grace. For instance, we say the country presents some graceful undulations; and again we say a winding stream through meadows with overhanging trees, is lovely. The same idea is also expressed in vegetation by the natural grace of the branches, the beauty of the flowers and foliage. Straight, angular, or broken lines, on the contrary, denote hardness and artificiality, though these may be entirely in keeping, when designed in connection with the architecture of the buildings, such as the terrace, the parterre, the Dutch garden, the avenue, the forecourt, etc.

The great principle underlying beauty in Landscape Gardening is unity, the harmony of all parts, the adaptation of the design of the garden in the immediate vicinity of the house to its architecture, passing gradually from that to the natural, as the garden recedes from the house, until it merges into the scenery of the surrounding country. This, however, requires different treatment in accordance with our particular views of the character of the scenery, which may be divided into the following distinctive characteristics: (1) Grand; (2) Picturesque; (3) Wild; (4) Peaceful; and (5) Uninteresting. The characteristics are represented by:—

(*a*) Agricultural Scenery,
(*b*) Aquatic Scenery,
(*c*) Mountainous or Rocky Scenery,
(*d*) Pastoral Scenery,
(*e*) Seascape Scenery,
(*f*) Sylvan or Wooded Scenery,
(*g*) Urban Scenery,
(*h*) Wild Scenery.

In reproducing Nature in gardens, the idea governing this should be to borrow from her most agreeable scenes, improving that which is most beautiful by adding thereto harmony and variety in arrangement and colour, and concealing, or omitting, any imperfections. To attain this ideal there must be simplicity in design, gentleness in outline, easy undulations of the land, graceful winding walks, also a few appropriate ornaments in keeping with the architecture of the house. One also needs to give due consideration to the laws of light and shade in the planting of heavy or light foliaged trees and shrubs; to colour, in the judicious introduction of bright-coloured foliage plants, with those of more sombre character; to the combination of foliage for autumnal tints; to the harmony of new plantations with the general effect of the landscape; to comparative proportion of the several features or objects; as well as to the relative convenience of the different parts of the garden, and to the cost of maintenance, so that it shall not exceed the sum that the owner is disposed to pay.

Where the property is not situated in the town or suburb, it is important to hide the boundaries in such a manner that it is possible to obtain an uninterrupted view of the surrounding country. In open spaces this can be done by the use of a ha-ha, or a light iron post and wire fencing. Where there are already walls or close fences, these should be hidden by shrubs or ivy, so that their existence is not detected at a distance.

The judicious arrangement of the lawns contributes greatly to the beauty of the garden, especially if it is possible to embrace a view of the country beyond. They should be embellished with plantations or groups of trees, and a few isolated specimens placed in positions to bring nearer or to push back the perspective.

Water is always a source of pleasure, and gives life to the landscape. When it is running, it is often possible to vary it by widening or checking the stream in places, making it descend suddenly over a cascade or rapids broken by rocks placed loosely or arranged across the stream. In the case of still water, the natural position for it is at the bottom of a valley, or in the lowest part of the property. It should receive simple and natural treatment, a careful distribution of light and shade, and the arrangement of suitable trees and plants on the sides or margin.

The formal or geometrical style of Landscape Gardening has been handed down from remote times, when the few gardens then existing were small, enclosed with walls within the Monasteries, and were used principally for the cultivation of plants for food and medicine. At a later period there arose a desire to have a pleasure garden in connection with the larger mansions that were then being erected; these were likewise treated in the formal style, with straight walks, plots of grass, severe parterres, clipped hedges, and avenues of trees.

Modern Landscape Gardening is in reality a composite or mixed style, being a judicious blending of the two former, and may be considered the intimate union of Art and Nature, of Architecture and Landscape.

To attain the best results in unity of design and harmony of the different parts, it is necessary to have a suitable knowledge of architecture, to understand the style of the garden which is to surround the house, to have the eye of an artist in designing the picture, and the knowledge of an engineer and gardener in carrying it out.—A. G. J.

LANDSCAPE STYLE.—See *GARDEN PLANS.*

LANTANA (Nat. Ord. Verbenaceæ). This is a genus of free-flowering, slightly scented, evergreen shrubs which are propagated by cuttings of half-ripened wood in the spring, in slight bottom heat. Pot in fibry loam, a little peat, and sand. Temperature required, 40–50° F.

Greenhouse Species and Varieties.—*Lantana delicatissima.*—Pale rose. Flowers from June to September. Height, 1–2 ft.

L. Drap d'Or.—Bright yellow. Flowers from June to September. Height, ½–1 ft.

L. lilacina.—Rose. Flowers from June to September. Height, 1–2 ft.

L. Magenta King.—Purple-scarlet. Flowers from June to September. Height, 1–2 ft.

L. Rayon de Soliel.—Deep yellow. Flowers from June to September. Height, 1–2 ft.

L. salviaefolia.—Red. Flowers from June to September. Height, 1–2 ft.

LAPAGERIA (Nat. Ord. Liliaceæ). This is a beautiful evergreen greenhouse creeper, with bell-shaped flowers hanging in clusters from the rafters of the greenhouse or conservatory. It is propagated by cuttings or layers in November in sandy peat. Pot or plant in good peat and sand, giving plenty of shade and moisture. Temperature needed, 40–45° F.

Greenhouse Species. — *Lapageria alba.*—Pure white. Flowers from October to December. Height, 2–15 ft.

L. rosea.—Deep rose. Flowers from October to December. Height, 2–15 ft.

L. superba.—Deep crimson. Flowers from October to December. Height, 2–15 ft.

NEW VARIETY.

Lapageria alba delicta.—This has large pale blush flowers, with pink veins.

LAPEYROUSIA (Nat. Ord. Iridaceæ).—Only one species of this genus is at all generally grown. This, *L. cruenta*, bears vivid red flowers spotted with black, from June onwards, and averages about 18 ins. high. It requires the usual treatment given to half-hardy bulbs, being potted in light soil in the autumn, and brought on in a greenhouse in the usual way.

LAPPA.—Now included in the genus *ARCTIUM.*

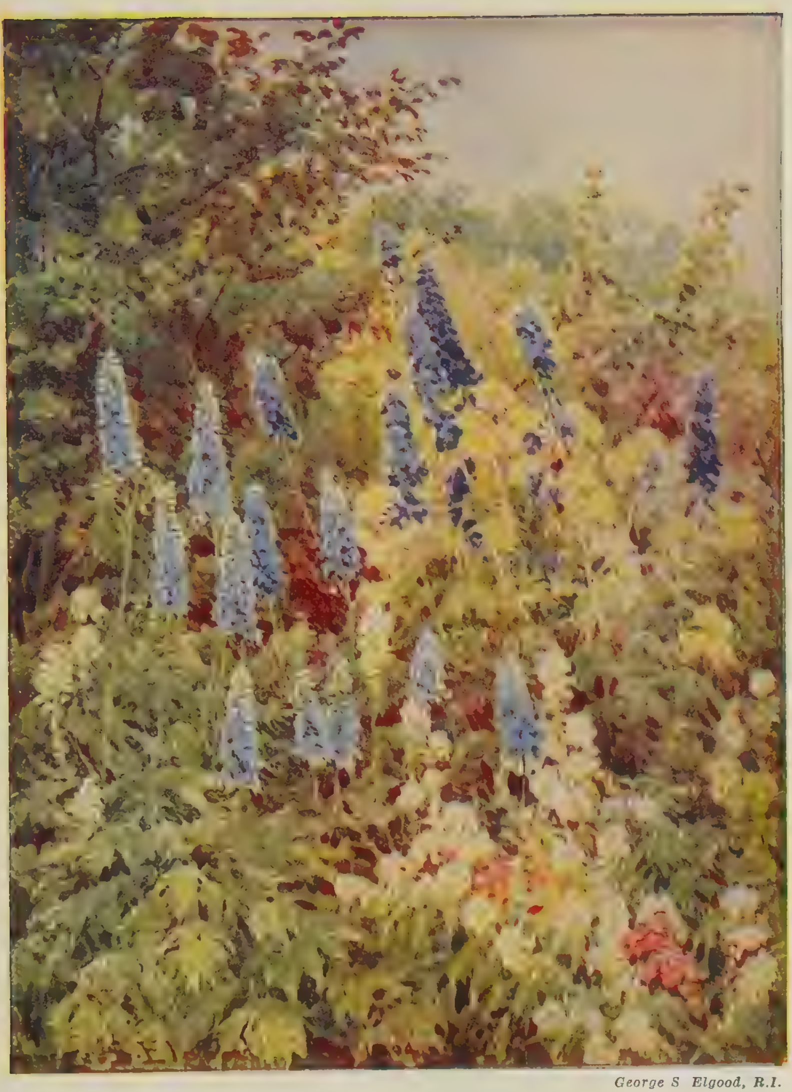
LARCH (*Larix europaea*).—See *TREES.*

LARCH APHIS.—See *INSECT PESTS.*

LARCH CANKER.—See *DISEASES OF PLANTS.*

LARCH ROOT ROT.—See CONIFER ROOT ROT in *DISEASES OF PLANTS.*

LARCH SAWFLY.—See *INSECT PESTS.*



George S Elgood, R.I.

LARKSPUR AND MEADOW RUE

LARGE CHAFER GRUB and LARGE COCKCHAFER.—See under CHAFERS in *INSECT PESTS.*

LARGE EARWIG.—See under EARWIGS in *INSECT PESTS.*

LARGE-FLOWERED EVERLASTING PEA (*Lathyrus grandiflorus*).—See *CLIMBING AND TRAILING PLANTS.*

LARGE-FLOWERED LILY TREE (*Magnolia grandiflora*).—See *CLIMBING AND TRAILING PLANTS.*

LARGE-FLOWERED WISTARIA (*Wistaria multijuga*).—See *CLIMBING AND TRAILING PLANTS.*

LARGE GARDEN SNAIL.—See under SLUGS AND SNAILS in *INSECT PESTS.*

LARGE TRUMPET FLOWER (*Tecoma grandiflora*).—See *CLIMBING AND TRAILING PLANTS.*

LARGE WHITE BUTTERFLY.—See under CABBAGE WHITE BUTTERFLIES in *INSECT PESTS.*

LARIX.—For best species see *TREES.*

LARKSPUR (*Delphinium.* Nat. Ord. Ranunculaceæ). — Many people do not know that the ever popular Larkspurs or Lark's Heels are close relatives of the stately perennial Delphiniums. The garden forms of the latter have been obtained chiefly from *Delphinium grandiflorum,* while the Larkspurs, as generally understood, have no doubt been evolved from *D. Ajacis* and *D. Consolida.* Larkspurs are elegant in foliage, stately in carriage, and effective in flower. The colour range found in the Rocket, Stock-flowered, and Emperor strains is fairly wide, from white, through shades of pink and rosy scarlet, to mauve and purple. The heights vary from 1 ft. in the dwarf forms, suitable for edging or massing, up to 3 ft. in the taller sorts, which are most valuable for grouping in large beds or borders. Plants raised in the autumn and winter in frames generally give the best results, but fine displays may be produced from a sowing in March. All Larkspurs pay for liberal treatment, and the taller kinds need the support of slender sticks. It may be added that practically all the Larkspurs make beautiful pot plants for conservatory decoration, and there are double as well as single-flowered varieties of most colours.

What to Grow.—Below we describe the best sorts :—

Delphinium Ajacis (Syns. *D. ambiguum* and *Consolida* of Sibthorpe).—This attractive, many-coloured, summer-flowering sort is a British plant and the forerunner of the Rocket group of Larkspurs. Its height is 1½ ft.

D. Consolida (Syns. *D. monophyllum, paniculatum, segetum,* and *versicolor*).—A blue sort with flowers in a loose spike which blooms in the early summer. From it the *Emperor* and other free-branching strains have been evolved. Its height is 1½ ft.

For herbaceous species, see article on *DELPHINIUM.*

LASER-WORT.—See *LASERPITIUM.*

LASERPITIUM (LASER-WORT. Nat. Ord. Umbelliferæ).—This is a genus of weedy, hardy herbaceous perennials. A large number of species have been described, none of which have much garden value. By some authorities the species are divided up amongst other genera, such as *Cachrys, Guidium, Ligusticum, Siler,* and *Thapsia.* Probably the best known species is *L. latifolium* (Syn. *L. glabrum*), popularly known as HERB FRANKINCENSE.

LASIAGROSTIS.—Now included in the genus *STIPA.*

LASTREA. — See NEPHRODIUM in *FERNS AND FERN GARDENING.*

LATANIA. — See under *Livistona chinensis* in *PALMS.*

LATE BLIGHT.—See *POTATO BLIGHT.*

LATE DESSERT PEARS.—See notes at end of *PEAR.*

LATE-FLOWERING CHRYSANTHEMUMS.—See *CHRYSANTHEMUMS: CULTIVATION OF.*

LATHYRUS (Nat. Ord. Leguminosæ).—This family, to which the Sweet Pea belongs and which now includes the genus *Orobus*, contains many annual species, some of which are climbers and some dwarf. Most of these are interesting, but they are not very effective for garden decoration. All the hardy annual species are quite easily raised from seeds sown in ordinary garden soil in autumn or spring, though slugs are very fond of the young seedlings.

Some of the best of the climbers are: *annuus* (yellow); *Nissolia* (crimson); *odoratus* (see article on *SWEET PEAS*); and *tingitanus*, the TANGIER PEA (purple-red).

A few of the dwarfer sorts that may be mentioned are: *angulatus* (red); *Cicera* (red); *sativus*, the CHICKLING VETCH (white); and *sphaericus* (crimson).

Perennial Border and Rock Garden Species.—The best of the Climbing Perennials are mentioned in our article *CLIMBING AND TRAILING PLANTS* (which see), so in the present paragraphs we confine our attention to some of the best herbaceous perennial species, all of which are exceedingly hardy and will thrive with little care in the commonest of garden soil, spreading more or less rapidly. They are extremely easy to propagate by division of the roots in the spring, and cuttings of young growth in the summer if pegged into light soil in a frame will root very freely.

Lathyrus albus. See *L. pannonicus.*

L. alpestris.—This is a pretty sort bearing purple flowers from midsummer to the end of July. It grows about 1½ ft. high.

L. canescens.—Syn. *L. filiformis*, which see.

L. cyaneus.—This bears attractive pink flowers, of which there is a blue form. Its flowering period is June and July, and its height about 12 ins.

L. filiformis (Syn. *L. canescens*).—This is a useful violet-purple, free summer blooming sort about 12 ins. high.

L. glaucifolius.—Syn. *L. ochroleucus*, which see.

L. hirsutus.—This bears red flowers from April to May, and grows about 1 ft. high.

L. luteus (Syn. *L. montanus*).—The two forms of this are both attractive plants. *L. luteus* itself is a deep orange-yellow, but its variety *aureus* is pale, almost lemon-yellow. Both are free summer blooming subjects growing about 1½ ft. in height.

L. niger.—This is an attractive purple sort blooming from June to July, and averaging 18–24 ins. high.

L. ochroleucus (Syn. *L. glaucifolius*).—This is a pale almost cream-yellow sort blooming from June onwards, and growing 18–24 ins. high.

L. pannonicus (Syn. *L. albus*).—This has many-coloured flowers, chiefly shades of red. It blooms from April to May, and grows 1–2 fts high.

L. vernus (Syn. *Orobus vernus*).—This bears dark blue or purplish flowers from April onwards, on plants 12 ins. high. Useful varieties of it are: *albus* (white); *flaccidus* (pale purple); and *flore pleno* (double and palest rose).

LAUREL or SHINGLE OAK (*Quercus imbricaria*).—See *TREES.*

LAURUS.—For the best species see *SHRUBS.*

LAURUSTINUS (*Viburnum Tinus*).—See *SHRUBS.*

LAVANDULA (LAVENDER. Nat. Ord. Labiatæ).—This is a popular genus of sweet-smelling evergreen and hardy herbaceous herbs. The COMMON LAVENDER (*L. spica*) is probably the best known, and both its varieties *alba* and *nana* should be grown. The FRENCH LAVENDER (*L. Stoechas*) is not referred to as a herbaceous plant by the Kew authorities. That known popularly as SWEET LAVENDER (*L. dentata*) is a very favourite species. The TRUE LAVENDER, botanically known as *L. vera* (Syns. *L. angustifolia, L. officinalis, L. pyrenaica,* and *L. vulgaris*) is classed at Kew both as a hardy herbaceous perennial and as a shrub. This, the most important species of all, is briefly dealt with under LAVENDER in our article on *POTHERBS*. Care should be taken not to confuse this genus with *Statice*, popularly known as *SEA LAVENDER*, under which last name a separate article appears, or with *Santolina*, popularly called COTTON LAVENDER, for which see article on *SANTOLINA*.

See also *SHRUBS*.

LAVATERA (MALLOW. Nat. Ord. Malvaceæ).—This is a genus of greenhouse shrubs, hardy annuals, biennials, and perennials. The first group is out of the scope of the present work, but we briefly describe the other sections below :—

Annual Species.—The only hardy sort is *L. trimestris*, a large bushy plant that may be raised from seeds sown in autumn or spring where the plant is to flower, as it resents transplantation. It bears charming silver-rose flowers in the summer and autumn, and grows about 2 ft. high.

The plants catalogued as *L. grandiflora*, *L. splendens*, and *L. s. rosea* are large-flowered strains of *L. trimestris* of high garden value.

Biennial Border Species. — These require the usual treatment for hardy biennials, and succeed in ordinary garden soil in a sunny position. Some of them are useful for cutting. The following species are recommended :—

Lavatera arborea (TREE MALLOW). This well-known plant is extremely useful for borders. It bears purple flowers in July, August, and September, and grows 6 ft. high. See also notes on *VARIEGATED TREE MALLOW*.

L. biennis.—This nurserymen's sort is grown at Kew under its proper name, *L. punctata*.

L. punctata.—This is a very attractive border plant, bearing bright reddish flowers in July and August on plants 4–5 ft. high.

Perennial Border Species.—These require the usual treatment for hardy perennials, and thrive in ordinary open soil in a sunny site. They may be propagated by seed or division of the roots in the usual way, and a successful time for planting is February or March. We recommend the following species :—

Lavatera Olbia.—This pretty sort bears red or rose-pink flowers in August, and grows about 1 yd. high.

L. salvitellensis is now considered synonymous with *L. thuringiaca* below.

L. thuringiaca.—This bears pretty pale blue flowers in August, and grows about 4 ft. high.

See also *SHRUBS* and *VARIEGATED TREE MALLOW*.

LAVENDER.—The genus LAVANDULA. See *SHRUBS*.

LAVENDER (*Lavandula vera*).—See *LAVANDULA* and *POTHERBS*.

LAVENDER COTTON.—See *SANTOLINA*.

LAVENDER GRASS (*Molinia caerulea*). See *MOLINIA*.

LAW : GARDENING AND HORTICULTURAL.—See *GARDENING LAW*.

LAW AS TO NUISANCES and LAW AS TO TRAPS AND POISONS.—See *GARDENING LAW*.

LAWN MOWERS. — See MOWING MACHINES in *GARDEN APPLIANCES*.

LAWN MOWINGS ; THEIR USE IN THE GARDEN. — Few gardeners realise the enormous value of lawn mowings, or they would not burn them on the garden fire or allow them to rot with rubbish they intend burning, as they so often do.

For mulching purposes fresh or rotted lawn mowings are exceedingly valuable and should be largely used (see article on *MULCHING*). For digging in during the winter they form a valuable substitute for dung, especially if some bonemeal is added. Year-old lawn mowings are quite as mild as old hotbed manure, and may be used in the same way. Fresh lawn mowings may be used alone for the making of hotbeds where a sudden heat for a few days only is required. Mixed with a third of their bulk of fresh leaves a milder hotbed is the result, and mixed with fresh, strawy stable dung, a very economical hotbed is easily made. Mixed with vegetable refuse they induce it to rot more quickly, and an equal bulk of rotted lawn mowings and rotted weeds, etc., makes a useful manure for the bottom of celery trenches, especially if it is watered first of all with strong house slops. For digging into flower borders, lawn mowings about six months old prove invaluable where manure is scarce, and in the preparation of new borders, equal bulks of stable dung and month-old lawn mowings will be quite satisfactory. This does not exhaust the uses to which lawn mowings may be put, though it includes the chief.

Rotted Lawn Mowings.—Generally speaking, rotted lawn mowings are more generally useful than those which are fresh and green. There is, of course, a right way and a wrong one of making them rot, and as in most other cases the lazy way is the wrong one. The latter is the course usually adopted, and the mowings are allowed to fire their own heart out by being tipped carelessly down in a loose heap.

The best way of making them rot is to dig a large pit, similar to a manure pit, with a drain at the bottom as usual leading into a tub, so that nothing shall be wasted. Into this the mowings should be shot, and after they have been well trodden down a few buckets of strong slops, or water if slops are unavailable, should be emptied into them. The pit should be large enough to take the whole of the summer's supply of mowings, and the process of watering should be repeated after each weekly consignment of mowings has been emptied in. A full month should elapse after the last mowings have been added before the pit is touched. Then it should be dug out, using a fork or a sharp spade with a rounded blade to facilitate the work. The material should then all be mixed together and well broken up, some bonemeal being freely scattered over it meanwhile to improve it.

No time should be lost in using it after this, and the pit should not be disturbed sooner than necessary.

The strong smell of rotted or rotting lawn mowings makes it necessary that the heap or pit should be situated away from dwelling-houses, and work amongst it should only be done on a full stomach.—E.

See also *MULCHING*.

LAWN SAND.

While hand weeding is necessary to remove such deep-rooting weeds as dandelions and docks from lawns, there are many preparations which, if applied in the spring, will kill other weeds more or less effectually, and at the same time benefit the grass. These materials are known collectively as LAWN SANDS, and individually by some distinctive or fanciful name. It is inadmissible here to praise any one make more than another.

Home-Made Lawn Sand.—Where the gardener has a taste for chemistry, he can easily make his own lawn sand, and make it at far less cost than would be incurred were he to buy the proprietary articles. First of all he should get about 4 st. of fine silver sand, sea sand, or other sand free from chemical impurities. He should then make a mixture of 4 lb. dry Nitrate of Soda and 4 lb. Sulphate of Ammonia, adding to this about 3 lb. of fine ground Sulphate of Iron. The mixture of the three chemicals should then be thoroughly mixed with the 4 st. of sand, adding a little at a time, and seeing that the chemicals are evenly mingled with the sand.

A cheaper lawn sand can be made by mixing together 1 lb. of Iron Sulphate and 3 lb. of Sulphate of Ammonia with 30 lb. of fine sand. This is specially suitable in districts where Nitrate of Soda is difficult to get.

Either lawn sand should be stored in tins or barrels till required for use, when it is scattered lightly over the turf in the usual way.

LAWN SWEEPERS.—See under MOWING MACHINES in *GARDEN APPLIANCES.*

LAWNS AND THEIR MANAGEMENT.—There is no better setting to the "stately homes of England," or the historic mansions which are scattered throughout the country, than a stretch of well-kept emerald turf. The magnificence of Westminster Abbey is intensified by the surrounding lawns in the same way that the grandeur of St Paul's is lessened by their absence. The "Gardens with their broad green walks where soft the footstep falls," were a striking feature of old times, and it is one of the most pleasing features of the modern landscape gardener's art that they are being freely introduced around our homesteads to-day.

The ideal lawn consists of a dense compact growth of the finest grasses. This can best be obtained by selecting varieties suitable for the locality, and giving them the cultivation necessary to produce the desired result. Nature has been very prodigal in giving us plenty of varieties of grasses to select from, and if we follow her lead we cannot do wrong.

Preparation of the Ground.—Turf of the best quality can only be produced on well-drained ground, and where necessary, draining should be done before anything else is attempted. There are very few soils which are not benefited by a judicious system of draining, and it is needless to expect to get a good lawn unless this is well done. The system of draining adopted should be such that the surface is quickly cleared of rain, and does not remain spongy for any length of time afterwards. When the drainage is completed, the ground should be either deeply dug or bastard trenched, taking care to retain the best soil on the top. Allow the ground to settle down before proceeding further with the work, because, however thoroughly it is rolled, the soil settlement is not so complete as is the case when the ground is allowed to solidify by the action of the elements. After the subsidence is complete, level the ground to the desired surface, and if the soil is of a rough or stony nature, it should be sifted to a depth of about 3 or 4 ins. These early cultural details exert a considerable influence on the future lawn.

Seeding and Turfing.—Seeding may be done either in spring or autumn. If the former period is decided upon, it is well to wait until all danger from frost is past, and yet sufficiently early to get the plants established before the summer drought commences. All things considered, April is generally the best month for sowing in spring. If autumn sowing is preferred, the earliest possible period after the last week in August, when rains have well moistened the ground, ought to be taken advantage of for doing so. If an analysis shows the soil to be deficient in any essential plant-food, it would be well to supply the deficiency before sowing the seed.

For lawns near the sea, *Festuca rubra* is one of the most useful grasses, while for city lawns the genus Poa is best. Taking lawns in general, a mixture of certain Agrostis, Cynosurus, Festucas of the ovina type, and *Poa trivialis*, answers well. The quantity of seed necessary to produce a good lawn varies from six to eight bushels per acre.

Where it is decided to use turf, the best way is to cut the turf into 1 ft. squares, and prepare these to an even thickness by laying them in shallow trays about 1½ ins. deep. These trays need to be made so that the turf can slide in and out, but otherwise to fit each square, so that there is no room for movement. Then with a sharp two-handled knife cut the underside to the gauged thickness. Treat the soil as advised for seeding, and get it rolled or trodden to an even, firm solidity. The turves can then be very quickly laid down, fitting them closely to each other, and the work when finished will present an accurate evenness that only requires intelligent cultivation.

Mowing.—Mowing should be started as early in the season as possible, and continuously followed up. It is a mistake to allow the grass to grow so long in spring that it has to be cut with a scythe before the lawn-mower can be used. A healthy well-nourished lawn cannot be mown too frequently while it is growing.

Rolling.—If a lawn has been well made there is not the need for the vigorous rolling to which it is frequently subjected. Many lawns are spoilt by rolling, especially if it is done in winter or when the ground is wet. If done at such times it causes a crust to form that renders it impossible for the finer grasses to exist, and creates conditions favourable for the growth of weeds. Rolling needs only to be done during the season of play on lawns used for sports, or to level the surface before mowing commences.

Renovating Old Lawns.—Most of the neglected old lawns can be got into a healthy condition by giving them suitable treatment. Impoverishment is generally the cause of their weedy, moss-grown condition. Winter is the best time to carry out the work of improvement, which consists of applying chemical preparations that will destroy the weeds, and at the same time nourish the grasses. When the weeds are removed, apply other nourishment to the grasses according to their requirements.

Shady Lawns.—These are improved by similar treatment to the above. *Poa nemoralis* is one of the best grasses to sow in the shade. Lawns can only be had in good condition by keeping them suitably nourished. As soon as mowing has ceased, apply chemical food in proportion to their needs. The neglect of doing so is the cause of many unsatisfactory lawns. A good lawn is a pleasant return for careful treatment.—J. McD.

LAWNS IN CITY GARDENS.—See *TOWN AND CITY GARDENING.*

LAWNS: TOP-DRESSING FOR. — See *TOP-DRESSING.*

LAWSON CYPRESS (*Cupressus lawsoniana*).—See *TREES.*

LAXTONBERRY. — See *BRAMBLES AND BERRIES.*

LAYERING.—See *PROPAGATION OF PLANTS.*

LAYERING RHODODENDRONS. — See under PROPAGATION in *RHODODENDRON.*

LAYIA.—See *TIDY TIPS.*

LAYING OF DRAINS.—See *DRAINING.*

LAYING OUT OF A FRENCH GARDEN. See *FRENCH GARDENING.*

LAYING OUT OF GARDENS AND PLEASURE GROUNDS.—See *GARDEN DESIGN, GARDEN PLANS,* and *LANDSCAPE GARDENING.*

LEACHIA.—Now included in the genus *COREOPSIS.*

LEAD ARSENATE.—See ARSENATE OF LEAD in *INSECT PESTS: GENERAL METHODS OF DESTRUCTION.*

LEAD COMPOUNDS.

Metallic lead finds many useful applications in the garden. Lead strips are used on greenhouse roofs, lead pipes are used for conveying water, leaden tanks are used for holding water, and so on. Melted with an equal quantity of tin, lead forms SOLDER, and every gardener knows how useful this is for mending burst water-pipes, making old water-cans hold water again, and for sealing up pots, cans, or glass jars containing sterilised fruit or vegetables. Attractive LEAD TREES for use in the formal or ornamental garden may be grown if a long rod of Zinc, or some similar metal, with one or two plain strips melted into it, is put for a time in a strong solution of say Lead Nitrate.

As the compounds of lead are all poisonous they are useless as fertilisers, and the use of most of them as insecticides or fungicides has not yet got beyond the experimental stage. Lead Acetate, the well-known SUGAR OF LEAD, as well as the phosphates and nitrate, have little horticultural value, though the first is used in the making of Lead Arsenate. This last is useful as a remedy for biting insects, and may be used with Bordeaux Mixture. Lead Carbonate and Lead Sulphate are ingredients of garden paints, the latter for those of inferior quality, while Lead Tetroxide (RED LEAD) is useful for rolling peas and beans in prior to sowing, to keep mice and birds off them.—E. T. E.

LEAD PLANT (*Amorpha canescens*).—See *SHRUBS.* A name also applied to the whole of the genus AMORPHA.

LEAD TREES.—See *LEAD COMPOUNDS.*

LEADEN FIGURES. — See *GARDEN FURNITURE.*

LEADWORT.—A name applied to the genus *CERATOSTIGMA* (Syn. *Plumbago*), which see. See also *PLUMBAGO.*

LEAF-BULBS. — See paragraph on TUBERS under CROP REQUIREMENTS in *MANURES.*

LEAF CROPS.—See *KINDS OF CROPS.* See also STEM AND LEAF CROPS under CROP REQUIREMENTS in *MANURES.*

LEAF CURL.—See under PEACH LEAF-CURL in *PEACH DISEASES,* and under LEAF-CURL in *POTATO DISEASES.*

LEAF CUTTINGS.—See *PROPAGATION OF PLANTS.*

LEAF ROLLER.—See under ROSE SAWFLIES in *INSECT PESTS.*

LEAN-TO GREENHOUSES. — See *GREENHOUSES AND FRAMES.*

LEATHER DUST.—See "Hoof Parings" in our notes on ORGANIC PRODUCTS under NITROGENOUS MANURES in *MANURES.*

LEATHER JACKETS.—See *INSECT PESTS.*

LEATHER-LEAF (*Cassandra calyculata*).—See *SHRUBS.*

LEAVES: Gathering, Storing, and Using.—Gardeners make a great mistake not to take advantage of the leaves which fall each autumn and use them as manure. Leaf-mould, or for that matter fresh fallen leaves, also form one of the most beneficial manures which can be applied to flower borders, the soil of which is heavy or medium; and if the fresh leaves be mixed with fresh cow or fresh pig manure, they form a highly desirable dressing for the vegetable garden, the soil of which is light. Rotted leaves, *i.e.* leaf-mould, is rich in that dark-coloured fat compound called humus. It is probably the richest in humus of all manures, but it is by no means the richest manure as far as plant-food is concerned. Leaf-mould properly made is peculiarly mild; it can be safely and advantageously applied to every kind of plant, including vegetables, known to the gardener; it can be applied to lawns, dug into every kind of border, used for protecting plants by heaping some of it over their crowns in the early winter, and it is an essential ingredient in almost every potting soil.

Considering the above points, it is advisable for gardeners to save as many leaves as they possibly can, for a cart full of leaves does not make very much leaf-mould. The first point which concerns us is:

Gathering Leaves.—Tidiness demands that the leaves shall not be long on the lawn or drives of the pleasure ground; but in the wild garden, and other places not in full view, the leaves can be left until all have fallen, to make one gathering up do. On the lawn and drives the best plan is to use a broom made of twiggy branches tied to a broomstick. Long sweeps can be made with this, and the work done much quicker. It is advisable to choose as still a day for leaf sweeping as is possible, but if the leaves have to be gathered up on a windy day they should, of course, be swept in the same direction as the wind is blowing, otherwise much extra labour will be entailed. Hard drives can be swept easily and quickly with an ordinary garden broom. The leaves should be swept into heaps in spots out of the wind. In collecting leaves in the wild garden or the shrubbery the wooden rake is about the best tool to use. It should, if possible, be a wide one, though rather smaller than the average hay rake; then the work will be speedily done.

It must here be pointed out that some leaves do not make good leaf-mould. Such include among the shrubs—aucuba, laurel, and rhododendron. Among the trees, the leaves from walnut, ash, plane, sycamore, poplar, and horse chestnut are not good for making into leaf-mould, indeed the leaves from plane trees are absolutely worthless, and where these trees are abundant, it is advisable to collect them separately and destroy them by fire. The presence of a few shrub leaves amongst other kinds dropped into the shrubbery will not prove detrimental to the ultimate leaf-mould, but any great quantity will tend to make its value much less. As is well known, oak and beech leaves make the best leaf-mould, and if a sufficient supply of these leaves from the home garden cannot be had, the gardener should make arrangements with the keeper of the nearest wood in order to get some.

Having collected the leaves the next question is the

Storage.—This may be a simple or difficult matter. The usual way, unless there are special facilities, is to dig a hole in the ground and shoot in all the leaves as collected, treading them well, and leave them for a year. However, very often this is not possible. In many gardens there is water very near the surface, and if a hole of the necessary size was dug, in a very short time it would be half-full of water. Although a certain amount of moisture is necessary for successfully changing leaves into leaf-mould, stagnant water will produce powerful vegetable acids which are highly detrimental to all plants. A kind of peat instead of leaf-mould is formed under such circumstances.

To avoid the possibility of "acid fermentation," as it is called, in districts where water is near the surface the leaves should be treated as follows: A square plot of ground in some spot away from trees is marked out with sticks, and round three sides of it a rough but thick wall of turf should be built. The leaves are then wheeled in, trodden down, and a few boards placed over them until they have all been collected. After this they are trodden down as firmly as possible, and either covered with a quantity of turf, or a good big load of manure stacked on to the top of them. This will compress them into very valuable leaf-mould.

Where there are special facilities, such as a corner between two buildings, the leaves can be stored there. It will not be necessary to cover them with manure or potting soil unless you wish for compressed leaf-mould, as they will not in such circumstances blow about.

Using Leaves and Leaf-mould.—We have described a few of their many uses at the beginning of this article, so need not repeat them. The gardener will find a large supply of leaf-mould quite indispensable.—E. T. E.

LEAVES OF PLANTS: Their Functions.—The term "leaf" covers a considerable variety of lateral appendages of the stem, which can be distinguished from branches by their form, position, and function. The leaf is usually flattened and bilateral. The typical green *foliage-leaf* consists of three parts. First, a basal portion, the *sheath*, which may or may not develop out-growths from its margins known as *stipules*, as in the Rose. The function of the sheath is the protection of the bud of the branch in its axil. The plane-tree affords an example of this, and the lime-tree shows how stipules are the protective agents. The middle part of the leaf is the *petiole*, which serves to project the leaf-blade into the air and light; it is usually, though not always, grooved along its upper side. The *leaf-blade* is the terminal portion of the whole; it is of very varied shapes, an enumeration of which occurs in any school botany book, as also are the numerous types of *hairs* clothing its surfaces, when these are not glabrous or smooth. The leaf-tip or apex also assumes very diverse forms, from the *truncate* tip of the tulip-tree leaf to the *acuminate* dripping-point of the sacred banyan.

The leaf-blade is traversed in most Dicotyledons by a midrib, having several main lateral veins from which a network of smaller ones ramify in all directions throughout the tissue. In most Monocotyledons a number of equal parallel veins, united by cross-connections, traverse the length of the blade. The function of the midrib and veins is to strengthen the blade against mechanical strains, to conduct water into all tissues, and to transfer the elaborated sap from the leaf into the stem.

The function of the leaf-blade is threefold:—

1. The manufacture by the chlorophyll or green colouring-matter contained in the corpuscles of the densely-packed cells of the darker green upper side, and more sparingly in the cells of the lower side, of carbohydrates, chiefly sugar and starch, by means of the carbon obtained from the carbon dioxide of the air, together with the hydrogen and oxygen obtained from the water conducted upwards from the soil. The sugar is passed down into the stem. Nitrogenous substances, consisting of the elements already mentioned, along with sulphur and nitrogen, are also manufactured in the leaf.

Light and an adequate *temperature* are necessary for the production of food-substances.

2. The *transpiration*, or giving-off, of the surplus water from the lower leaf-surface, a process helping to maintain the ascent of water through the plant. The tissue of the lower side of the leaf contains numerous air-spaces in which the water-vapour collects, until passing out through the *stomates* or pores which occur in great numbers among the surface-cells and often depressed below these. Stomates remain open or closed according to the amount of moisture in the atmosphere.

3. *Respiration*, or breathing, which the plant shares with the animal. This consists in the absorption of oxygen from the air and the expulsion of carbon dioxide, and occurs chiefly at night, but also (more slowly) in daylight, and always through the stomates.

Protection of the leaf against browsing animals, caterpillars, and slugs is afforded by hairiness, spininess (*e.g.* Gorse), or the possession of distasteful or injurious substances in the tissues, *e.g.* the needle-crystals of lime-oxalate in the cuckoo-pint (*Arum maculatum*) against slugs. A device to escape attacks from browsing animals is the arrangement of the leaves in a rosette pressed flat against the ground.

The leaves of plants growing in hot, dry climates are protected against excessive evaporation of water by (1) leathery texture due to thick epidermal cell-walls; (2) spiny consistence, involving great reduction of surface; (3) hairy or woolly covering of the surfaces; (4) waxy covering; (5) inrolling of the edges towards the lower transpiring surface, which is thus greatly sheltered; (6) turning of the edge towards the sun so that the rays do not fall full on the surface, as in *Eucalyptus*; (7) succulence, whereby the leaf becomes a reservoir of water, as in *Mesembryanthemum* and *Crassula*.

The leaf of many plants, *e.g.* *Monocotyledons*, is not differentiated, but has blade, petiole, and sheath merged into a simple lamina. The *scale*-leaf is devoid of chlorophyll and represents the leaf-base only; it occurs on underground shoots and on buds. The *cotyledons*, of which there are two, as a rule, in Dicotyledons and one in Monocotyledons, are usually very different in shape, and often in consistence, from foliage-leaves. Those which emerge from the seed above ground constitute the first one or two green leaves of the seedling. In other cases, *e.g.* the Oak, they are food-reservoirs, thick and fleshy, and remain below ground within the seed. In many Monocotyledons they act as suckers within the albumen of the seed, *e.g.* the Date Palm and the Onion; in the former, the cotyledonary stalk elongates and carries the embryo out; in the latter, it eventually appears above ground as a green leaf.

A *bract* is the green or coloured leaf which subtends an inflorescence or a single flower. *Bracteoles* are the (usually two) small leaves occurring alone on the flower-stalk. All the parts of the flower are modified foliage-leaves, having been evolved from them in the course of ages.

Very varied are the shapes and functions which leaves may assume. Some are modified for the purpose of catching insects, as those of the sundew (*Drosera*), Venus' fly-trap (*Dionaea*), and the remarkable pitcher-shaped terminal portion of the leaf in *Nepenthes*. In the side-saddle plant (*Sarracenia*) the entire leaf forms the pitcher. Many Bromeliads and the Teazel (*Dipsacus*) form water-tanks with their wide leaf-bases. The petioles of some (*Tropaeolum*) and the leaflets of others (Pea, Vetch) act as climbing organs in the form of tendrils. The Water Crowfoot has submerged leaves with linear or thread-like segments, while the floating leaves have a broad, slightly lobed blade.

W. C. W.

LEBANON CANDYTUFT (*Æthionema coridifolium*).—See *ÆTHIONEMA*.

LEBANON CEDAR (*Cedrus Libani*).—See *TREES*.

LEBANON OAK (*Quercus Libani*).—See *TREES*.

LECANIUM.—See BROWN SCALES in *INSECT PESTS*.

LEDUM.—For the best species see *SHRUBS*.

LEEDS' HYBRID DAFFODIL (*Narcissus Leedsii*).—See *NARCISSUS SPECIES*.

LEEK SMUT.—See ONION SMUT in *ONION DISEASES*.

LEEKS (*Allium Porrum*. Nat. Ord. Liliaceæ). — Although in some quarters leeks enjoy their full share of popularity, others leave much room for the wider recognition of these as one of the most wholesome and hardy of all winter vegetables. Failure to realise this is found chiefly among villagers and owners of small gardens, the majority of whom are under the impression that the cultivation of the crop entails considerable expense and much labour. Where extra large specimens are required for competitive purposes, the idea is not without some truth, but where supplies are wanted simply to meet the needs of the household, few crops are more easy to cultivate or so certain of giving good results.

Sowing.—Those who aim at large specimens should sow under glass early in January, putting three seeds in the centre of a thumb pot filled with a sandy compost. This is preferable to the more popular plan of sowing in pans or boxes, for where this last is done, a disturbance and breakage of roots can hardly be avoided prior to transplanting, which has to be done while the plants are still small and the roots very susceptible of injury.

Plants raised as above should be carefully hardened off by the occupation of a cold frame for about three weeks, the first fortnight in May being quite early enough to place them in their summer quarters.

For general use, an outdoor sowing made any time during March, or early April, may be expected to give satisfactory results.

A sturdy growth being at all times desirable, this should be borne in mind by the person sowing the seed. If a little finely sifted light sandy soil is scattered along the drills previous to sowing, the number of nice little roots each plant carries when transplanting becomes necessary, will be considerably greater than when the seed is sown in ordinary garden soil.

Planting Out.—For very large specimens it is usual to prepare a trench in a similar manner to that described in the article on *Celery*, the roots of these appreciating plenty of rich manure, that obtained from butchers' yards being excellent. We have also found the residue from cesspools and earth-closets, if buried sufficiently deep to ensure the roots being of considerable strength before reaching it, is the very finest aid to large growth, but for all ordinary purposes the grower may dispense with trenches, also extra heavy manuring; a dressing equal in bulk to that usually allowed for onions, or other crops, ensures splendid results if a foot is allowed each way between the plants.

Where the soil is in a highly fertile state, and the potato crop lifted early in June, strong Leek plants may occupy the same ground without further manure being added. If this is done, a foot between the rows and from 6–9 ins. between the plants will be ample.

When planting out, make a point of burying each plant as deep as the stem allows, leaving the lower leaves resting on the soil. Even where the soil is exceptionally fertile, or abundance of manure used previous to planting, this crop well repays a few thorough drenchings with liquid manure; and if these can be given during August and September, it will make an appreciable difference to the size of the Leeks.

Blanching may be done either by drawing the surrounding soil to the plants as growth proceeds, or by using brown paper, or collars made of zinc, sold by most seedsmen for the purpose. These latter, although expensive, last many years, and ensure the quality of the produce being of the very highest order. All the necessary blanching should be finished by the end of November, after which the crop may be left to itself. See also article on *VEGETABLES: BLANCHING AND FORCING.*

Varieties useful for any purpose include:—Ayton Castle Giant, Champion, Dickson's Exhibition, Dobbie's Model, London, Prizewinner, Royal Favourite, and The Lyon.—F. R. C.

For METHOD OF BOTTLING see *VEGETABLE BOTTLING.*

LEERSIA (Nat. Ord. Gramineæ). This is a genus of moisture-loving grasses which are of botanical interest as hardy perennials, but of small garden value. They may, however, be grown at the water's edge in the water garden, or at the sides of a running rivulet. The best known species is *L. oryzoides,* the RICE GRASS, which grows about 1 yd. in height.

LEGUMINOUS CROPS.—See *KINDS OF CROPS.*

LEIOPHYLLUM.—For the best species see *SHRUBS.*

LEMNA.—See *DUCKWEED.*

LEMON-SCENTED VERBENA.—See *ALOYSIA.*

LENTEN ROSE (*Helleborus orientalis*). See *HELLEBORUS.*

LENTILS.

It does not pay to grow these in this country, and land taken up by them had far better be cropped with something else, such as the DUTCH BROWN BEAN. (See article on *BEANS.*)

Lentils are imported so cheaply, and in such quantities, that the plant would have to be a very attractive one (which it is not) to be worthy of a place in English gardens to-day.

LEONOTICE (LION'S TURNIP. Nat. Ord. Berberidaceæ).—This is an unimportant genus of hardy or nearly hardy perennials, tuberous or rhizomatous. The best known species is probably *L. Leontopetalum,* popularly known as LION'S LEAF, a yellow April blooming plant about 9 ins. high.

LEONOTIS.—Now included in the genus *LEONURUS.*

LEONTODON.—See *HAWKBIT.*

LEONTOPODIUM (Nat. Ord. Compositæ).—A genus of tufted plants with woolly white leaves. They will thrive in the rock garden on sunny ledges planted in calcareous soil, and are propagated by means of seeds sown in gentle heat in March. The favourite species is:—

Leontopodium alpinum (EDELWEISS).—This has tufts of narrow leaves. Flowers white, in woolly heads, starlike in shape. Site, open. Flowering Period, June to August. Height, 6 ins.

LEONURUS (LION'S EAR, LION'S TAIL, and MOTHER WORT. Nat. Ord. Labiatæ).—This is a genus of very free flowering autumn and winter shrubs and border plants, of which the first section can be plunged out of doors in ashes during August and September. Cuttings of the shrubs taken in the spring root freely under a hand-light or frame with little bottom heat. Young plants should be pinched back in their early stages to make good bushy, flowering plants by the autumn. The shrubs will succeed in light, sandy loam, with one-third fibrous peat. Temperature required, 40–50° F.

Greenhouse Species.—*Leonurus grandiflora* (Syn. *Leonotis Leonurus,* LION'S EAR and LION'S TAIL).—Orange-scarlet. Flowers in October and November. Height, 1½–2½ ft.

L. ovata.—Orange. Flowers in August and September. Height, 1½–2 ft.

Perennial Border Species.—These require the usual treatment for hardy perennials, and succeed in common garden soil in a sunny site. They are best propagated by root division in the usual way in March, at which time they may be most successfully planted. As there are many better things they should only be grown in large collections. We recommend the following :—

Leonurus Cardiaca (Syn. *L. villosus*).—This is perhaps better known as the MOTHER WORT. There are various forms of it available, and it may be had in many colours, such as pure pink, rose-pink, pure rose, rosy-purple, purple-pink, pure purple, and pure red. It blooms from June onwards to October, and averages 2–4 ft. in height.

L. sibiricus.—This bears red flowers from July onwards, and averages 1–2 ft. in height.

LEOPARD'S BANE (*Doronicum austriacum* and *Senecio Doronicum*).—See *DORONICUM* and *SENECIO*.

LEPICYSTRIS.—Now included in the genus POLYPODIUM, for which see *FERNS AND FERN GARDENING*.

LEPIDIUM (CRESS. Nat. Ord. Cruciferæ).—This is an unimportant genus of annuals and hardy perennials of little beauty. *L. Draba* is the WHITLOW CRESS ; and *L. latifolium* goes by the name of DITTANDER. The best known species of all is, however, *L. sativum,* the salad known as GARDEN CRESS or simply CRESS. A few remarks on the culture of this will be found under MUSTARD AND CRESS in our article on *SALAD PLANTS*. The name CRESS applied to this genus must not mislead beginners to think that it includes all kinds of Cress, as this is very far from being the case. For the popular and botanical names of some of the more important kinds of Cress see the separate short article on this plant.

LEPIDOSAPHAES. — See MUSSEL SCALE in *INSECT PESTS*.

LEPTANDRA.—Now included in the genus *VERONICA*.

LEPTASEA.—Now included in the genus *SAXIFRAGA*.

LEPTOGRAMME.—Now included in the genus GYMNOGRAMME, for which see *FERNS AND FERN GARDENING*.

LEPTOPTERIS.—Now included in the genus TODEA, for which see *FERNS AND FERN GARDENING*.

LEPTOSIPHON.—Now included in the genus *GILIA*, which see.

LEPTOSPERMUM (Nat. Ord. Myrtaceæ).—This is a genus of greenhouse evergreen shrubs from Australia, of easy culture, succeeding well in any ordinary greenhouse. Cuttings of young shoots are the best means of propagation. Set these firmly in May, in a mixture of peat and silver sand, placing under a bell-glass or hand-light with slight bottom heat and well shaded from the sun. Seeds may be sown in a warm house or hotbed in March. A suitable soil is two-thirds peat, one-third loam, and silver sand. Temperature required, 40–45° F.

Greenhouse Species. — *Leptospermum ambiguum* (Syn. *Kunzea corifolia*).—White. Flowers in June. Height, 4 ft.

L. flavescens.—White. Flowers in June. Height, 4–5 ft.

L. grandiflorum.—White. Flowers in June. Height, 6–8 ft.

L. multicaule.—White. Flowers in June. Height, 4–5 ft.

L. pendulum.—White. Flowers in July. Height, 4–5 ft.

L. scoparium.[1]—White. Flowers in June and July. Height, 2–6 ft.

NEW VARIETY.

Leptospermum Donard Beauty.—This has large red flowers edged with pink.

---

[1] Its leaves are used as tea.

LEPTOSYNE (Nat. Ord. Compositæ).—Several species of these Coreopsis-like plants are annuals, and most of them come from California. The only one of undoubted hardiness is *L. Stillmannii,* which, if sown in a sunny position in well-cultivated soil in April, will come into flower in about six weeks' time, producing its blooms on long stems. It produces large yellow flower-heads, which are grand for cutting, and grows 18 ins. high.

The only PERENNIAL BORDER SPECIES at all generally grown is *L. maritima,* a yellow summer and autumn flowering species about 1½ ft. high.

LEPTURUS (Nat. Ord. Gramineæ). This is an unimportant genus of grasses of no garden value. The best known species is *L. cylindricus,* the SEASIDE HARD GRASS, a plant so familiar to all of us that no description is necessary.

LESPEDEZA.—For the best species see *CLIMBING AND TRAILING PLANTS* and *SHRUBS.*

LESSER FLEA-BANE (*Pulicaria vulgaris*).—See *PULICARIA.*

LESSER PLANTAIN (*Plantago media*). See *PLANTAGO.*

LESSER SPEARWORT (*Ranunculus Flammula*).—See note at end of *RANUNCULUS.*

LETTUCE (*Lactuca sativa.* Nat. Ord. Compositæ).—A good crisp lettuce any time from early in May until the close of summer rarely fails to meet with general acceptance, and although in the most favourable seasons it must be allowed that quite good results often follow indifferent or lazy cultivation, where the soil is poor and the summer hot and dry, not only will the lettuces grown under such conditions be small and of very inferior quality, but there is great risk of losing the whole crop owing to premature running to seed. Soils, seasons, and variety sown count for so much with this crop that, where lettuces are highly prized, the importance of always ensuring the conditions under which the crop is to be grown to be as near ideal as possible, should be fully recognised. These three conditions may be summed up as follows: A deep and heavily manured ground, plenty of room for the proper development of every leaf the plant produces, and abundance of moisture at the root throughout all stages of growth. Where this is assured there need be little fear of anything but satisfaction following a sowing made at any time.

Sowing.—To get fully grown lettuce early in May, a pinch of seed should be sown in a warm greenhouse early in February, always providing a well-drained pan and using a light porous soil. The seed, which invariably germinates exceptionally well, should be sown very thinly, covered with a very light sprinkling of soil, and after the little plants appear, water must be given with more than ordinary care, or many will damp off before attaining a size large enough for transplanting. The seedlings from this sowing may be transplanted into other boxes as soon as each has made two true leaves, and if carefully nursed along in the house, and gradually hardened off by placing for a week or fortnight in a cold frame, they should be ready to occupy a sunny border at the end of March.

Good lettuces from June onwards are usually ensured by making an outdoor sowing in a warm spot early in March; successive small sowings every fortnight until the end of August should carry on the supply until winter sets in.

Transplanting should always be done while the plants are quite small, for the twofold reason that they suffer but little check, and plants allowed to remain in the seed-bed until they get large take a long time to get their roots well established in new soil, invariably proving disappointing even if constantly watered.

Where space permits, instead of sowing in the ordinary seed-bed, better and more rapid results will follow if seed is sown in the open garden where the crop is to mature, no transplanting to be attempted. If this is decided upon, the seed should be sown very thinly indeed, and whenever possible protection afforded against birds, which soon play havoc with the seedlings when they appear. When well through the soil reduce the number of plants, leaving them 3 ins. apart, and later 6 ins. When these latter nearly touch, pull out each alternate plant, at which stage they make a most excellent salad.

Overcrowding being one of the most fruitful causes of "bolting," this should be guarded against. It is safe to plant at 6 ins. apart, pulling up each alternate plant when about half grown. From this stage onward, plenty of moisture will be needed, and feeding will much improve both growth and quality.

Winter Lettuce.—Good lettuce may be had all the winter by those possessing garden frames. The seed should be sown early in September, and after placing a good bed of rich soil in the frame, fill it with the strongest of these plants as early in October as possible, giving plenty of fresh air in favourable weather.

On light soils, seeds of one of the more hardy varieties may be sown in August, and planted out in the open garden. These often pass the winter unharmed, but the quality is rarely as good as others more quickly produced, and for this reason large sowings are not advised.

Varieties. — *Cabbage Sorts.* — Sutton's Ideal, Lord Kitchener, Favourite, Early Market, May King, Wonderful, Defiance, Reliance, All the Year Round, Stanstead Park, MacHattie's Giant, the last three being suitable for autumn sowing and winter use.

Select Cos Sorts.—Jumbo, Kingsholm, Crystal Cos, Vaux's Self-Folding, Exhibition, Bath Black Seeded, Dunnett's Bath, Hick's Hardy, the last three for autumn sowing and wintering out of doors.

F. R. C.

[Other Salad Plants are dealt with in our article of that title.—EDITOR.]

LETTUCE ROOT APHIS.—See *INSECT PESTS.*

LEUCANTHEMUM.—Now included in the genus *CHRYSANTHEMUM.*

LEUCOCYCLUS.—Now included in the genus *ANACYCLUS.*

LEUCOJUM.—See *SNOWFLAKE.*

LEUCOPLASTS. — These are starch grains. See FOOD STORAGE AND DIGESTION in *PLANT PHYSIOLOGY.*

LEUCOSTEGIA.—Now included in the genus DAVALLIA, for which see *FERNS AND FERN GARDENING.*

LEUCOTHOE.—For the best species see *SHRUBS.*

LEVELLING.

Large areas, such as land for tennis courts, will prove too difficult for the gardener to level successfully, and the work should be entrusted to experts who are doing this kind of thing every day. Smaller areas can be done with the aid of a spirit-level. Levelling is an operation which requires much patience on the part of the inexperienced gardener. As it is very expensive on a large scale, none but very serious consideration should be given to such work before starting.

LEVISTICUM (LOVAGE. Nat. Ord. Umbelliferæ).—One species of this genus, *L. officinale,* and its variety *variegatum,* both popularly known as LOVAGE, are sometimes grown in the borders, and are hardy herbaceous perennials of the easiest culture. The genus was once united with *LIGUSTICUM,* upon which we devote a separate short article. The English name of both genera is LOVAGE, and it seems a pity to keep distinct, plants which are so greatly similar as these.

LEWISIA (BITTER-ROOT, SPATLUM. Nat. Ord. Portulaceæ).—This is a genus of Californian plants with succulent leaves and richly coloured flowers. All are suitable for the rock garden, and should be planted in a dry position in full sun. It is essential that they are kept dry after growth is finished and during the winter. They are easily propagated by means of seeds sown in spring in a little heat. We recommend the following five species :—

Lewisia Cotyledon.—This has rosettes of fleshy leaves. Flowers pink, striped with buff or white. Site sunny. Soil rocky. Flowering Period, May to June. Height, 4 ins.

L. Howellii.—This is similar to the above, but with narrower leaves having crisped margins. Flowers pink, but striped with white. Site very sunny. Soil rocky. Flowering Period, May to June. Height, 4–6 ins.

L. Leana.—This has tufts of narrow, fleshy leaves. Flowers small and pink, striped with white. Site sunny. Soil rocky. Flowering Period, June. Height, 2–4 ins.

L. rediviva.—This has rosettes of narrow green leaves. Flowers large and bright satiny rose. Site very sunny. Soil rocky. Flowering Period, June to July. Height, 4 ins.

L. Tweedyi.—This has rosettes of broad, fleshy leaves. Flowers bright pink and large. Site sunny. Soil rocky. Flowering Period, August. Height, 4 ins.

LEYCESTERIA.—For the best species see *SHRUBS.*

LIATRIS (BUTTON SNAKE-ROOT. Nat. Ord. Compositæ).—Several species of *SERRATULA* are now considered species of this genus, which contains a number of very beautiful herbaceous perennials which are nearly hardy. They are useful alike for the perennial border or the sunnier and warmer parts of the mixed border, but in cold, exposed districts do not stand the winter very well, and are best lifted in late October. The little balls of soil round the roots are then sunk in coke dust in a frame till March, when as a rule they may be safely replanted in the open ground. As regards soil they are not very particular, but appreciate a light medium containing some peat, and are not fond of lime. Propagation is best effected by division of the roots in the spring, and though autumn planting is highly successful in such warm counties as Cornwall, March planting will be more satisfactory elsewhere. We recommend the following species :—

Liatris acidota (Syn. *L. mucronata*).—This is a purple August flowering sort, growing about 4 ft. high.

L. elegans (BLAZING STAR).—This is probably the most favourite sort of all, with its bright purple flowers in September. It grows about 4 ft. high.

L. graminiflora.—This is a most attractive pink August blooming sort, about 1 yd. high.

L. mucronata.—Syn. *L. acidota* above.

L. punctata.—This bears purple flowers in August, and grows 3–4 ft. high.

L. pycnostachya (KANSAS GAY FEATHER).—This attractive sort bears rich purple flowers from August to September, and grows 3–4 ft. high.

L. scariosa (Syn. *Serratula scariosa*).—This bears purple flowers in July and August, and grows about 1 yd. high.

L. spicata (Syn. *Serratula spicata*).—This is a very attractive sort, bearing tall spikes of purple flowers in September, and growing nearly 2 yds. in height.

L. tenuifolia.—This bears purple flowers in September and October, but rarely exceeds 2 ft. in height.

LIBANOTIS.—Now included in the genus *SESELI*.

LIBERTIA (Nat. Ord. Iridaceæ). This is a genus of herbaceous perennials not very hardy in the colder districts, and thus benefiting by being wintered in a frame or cold greenhouse. They prefer a mixture of good peat and maiden loam, while the best way to propagate is by root division in the spring. We recommend the following: *L. formosa* (Syn. *L. ixioides* of some authorities); *L. grandiflora* (the best species); *L. ixioides* (classed at Kew as a distinct species); and *L. pulchella* (Syn. *L. Laurencii*). All bear white flowers from early April to the end of May, and average about 1½ ft. in height.

LIBERTY CAP.—See HARMFUL FUNGI in *FUNGI: EDIBLE AND HARMFUL*.

LIBOCEDRUS.—For the best species see *TREES*.

LIFE HISTORY OF FLOWERING PLANTS.—See *PLANT PHYSIOLOGY*.

LIGHT AND GERMINATION.—See *GERMINATION OF SEEDS*.

LIGHT SOILS: ARTIFICIALS FOR.—See *ARTIFICIAL FERTILISERS*.

LIGHT SOILS: VEGETABLES FOR—See *VEGETABLES: GENERAL CONSIDERATIONS*.

LIGHTNING GARDENING.

Nowadays the gardener, like most other folk, is often anxious to get quick results. In this connection a curious plan known as lightning gardening is of interest. By this means the seeds of some of the salad plants, such as mustard and cress, lettuce, etc., may be induced to germinate in an hour or so, and even show a certain amount of leaf development. As a first step the seeds must be soaked in water[1] for at least twenty-four hours. Then prepare a mixture as follows: Get a bucketful of fine light soil and a lump of fresh quicklime about the size of one's fist. Put the lime on some flat surface and grind it to a powder, taking care to keep it quite dry. Then thoroughly mix the lime with the soil, which should be rather dry.

Place the soil and lime in boxes or pans to the depth of about 3 ins. Taking the seeds that have been soaking, scatter them somewhat thickly on the soil. Cover with a very thin layer of more soil, water through a fine rose, and finally cover the boxes with sheets of glass. The action of the water on the lime causes this to heat, and the high temperature of the soil brings about an astonishingly rapid germination of the seeds. In a very short time these burst through their cases and the small plants appear. The growth continues until the seedling leaves have developed.

A somewhat similar idea is that which French growers occasionally adopt to secure the rapid opening of roses. In this case a bush is selected in which the buds are in an advanced state but not expanded. A trench is opened up about 6 ins. deep around the bush, and into this is scattered a few handfuls of powdered alum. The soil is then filled in. The bush is covered with matting, or similar material, arranged on a wooden framework. Water is poured on to the ground where the trench was dug out and the action on the alum generates heat accompanied by volumes of steam. In the course of an hour or so the rosebuds expand into perfect flowers.—S. L. B.

---

[1] Alcohol has been used in some experiments, but its use is not to be recommended as it does not produce reliable results.

LIGULARIA.—Now included in the genus *SENECIO.*

LIGUSTICUM (LOVAGE. Nat. Ord. Umbelliferæ). — As already remarked in our article on *LEVISTICUM,* this last-named genus was once united with the one now under notice, but at the present time is considered distinct from it. Both have the same English name, both are hardy herbaceous perennials, and both are similar in action. As a medicinal plant Lovage has, however, declined ; it was once used for a large variety of purposes and obtained considerable popularity as a diuretic. Now, however, PARSLEY PIERT (see article on *MEDICINAL HERBS*) seems to have superseded it. A number of species are grown, such as *L. actaeifolium*, *L. mucronatum*, *L. pyrenaicum*, and *L. Thomsoni.* The most popular species is probably *L. scoticum*, the SCOTCH LOVAGE, a pink summer blooming plant about 1 yd. high, of which a white form is also available.

LIGUSTRUM.—For the best species see *SHRUBS.*

LILAC.—A name applied to the genus SYRINGA, which see in *SHRUBS.*

LILIES (Nat. Ord. Liliaceae).

The family of the Lily is a large one. About fifty species are under cultivation, in addition to a number of Hybrid Seedlings. They can be divided into six distinct sections :—

1. CARDIOCRINUM includes varieties such as *Lilium cordifolium* and *Lilium giganteum,* with large funnel-shaped flowers on tall stems with heart-shaped leaves.

2. EULIRION includes *Lilium candidum, Lilium japonicum, Lilium longiflorum, Lilium Parryi, Lilium Wallichianum,* large flowered, trumpet shaped, and mostly light coloured.

3. ARCHELIRION includes *Lilium auratum, Lilium speciosum, Lilium tigrinum,* etc. etc., mostly large spreading flowers, very attractive in colour.

4. ISOLIRION includes *Lilium concolor, Lilium croceum, Lilium dauricum,* etc. etc., very hardy, generally early flowering, and mostly erect in flower and cup-shaped.

5. MARTAGON includes all the most common garden Lilies of the Turk's Cap Tribe, such as *Lilium chalcedonicum, Lilium Martagon, Lilium monadelphum, Lilium pardalinum, Lilium polyphyllum, Lilium superbum, Lilium testaceum,* etc., reflexed petals and very showy.

6. NOTHOLIRION includes *Lilium Hookeri* and *Lilium roseum,* quite distinct from other species.

Culture.—As regards cultivation, there is no great difficulty. Lilies can be grown in any ordinary garden, but most of the varieties like peat, and this should be applied at the time of planting, when the soil should also be enriched with manure. Some varieties like a little shade, but should not be overhung by large trees. Lily bulbs should not be left out of the ground or uncovered for any length of time, and, when planted, they should remain in the same position for as long as possible, as they resent being disturbed. Great care should be taken not to plant the bulbs too deeply, and when once they are established, a good mulching with well-decayed manure will be of great assistance to the plants. Sheltered positions must be found when planting, as the larger number of the varieties of the Lilies grow erect and are easily blown down by the wind.

There are several methods of propagation, and plants can easily be raised from seed by bulblets which form in the axils of the leaves on some varieties, and also from the scales of the bulbs when pulled apart. Light soil should be used for this purpose and the scales inserted round the edge of a pot, when they will soon form little bulbs.

The whole of the Lily family is very decorative for borders, and some of the flowers are highly scented, making them additionally attractive.

Growing Indoors.—Some varieties are used for growing in conservatories or cool greenhouses, where they can easily be cultivated, and by using retarded bulbs, which can be obtained from seedsmen, the period of flowering can greatly be extended.

One of the best species for pot culture is *Lilium auratum*, and very large trusses of flowers can be obtained from one bulb. Other good sorts for growing inside are *Lilium giganteum*, *Lilium Harrisii*, *Lilium longiflorum*, *Lilium speciosum roseum*, etc. etc.

When growing Lilies in pots the bulbs should be placed in half-filled pots, which should be well drained, and a little peat should be incorporated in the soil. To prevent fungus, which often appears in imported bulbs, a little powdered charcoal should be spread on the bulb.

When the growth commences, moisture should be given, and an occasional syringing. As soon as good root action is obtained, and a growth appears in the centre, more soil can be added to the pots, and when the flowers are formed and begin to develop, a little liquid manure should be applied, but used very sparingly.

Some of the varieties are only half-hardy, and when grown in borders, attention should be given in the winter and the roots covered with litter or ashes, which should be removed again before growth commences in the spring.

The period of flowering extends from the early summer to well on into the autumn.

Much has been done of late years in the way of hybridising, and some very useful garden varieties will appear when flowering bulbs can be put on the market.

Sorts to Grow.—To include and describe all the varieties now in commerce would form a rather formidable list, but I give below a short description of some of the better known and popular sorts:—

Lilium auratum.—A good old Lily from Japan which needs no description as it is well known to all garden lovers. Colour, white with deep spots of purple; perfectly hardy in most parts of the country, but requires good soil and moisture. Flowers in August. Height, about 4 ft.

Lilium auratum platyphylum (Syn. *Lilium macranthum*). — A variety of *L. auratum* with very large flowers and foliage. The flowers average 10–12 ins. across and are richly spotted. Flowers in August. Height, 2½–3½ ft.

Lilium Brownii.—This is sometimes described as *Lilium japonicum Brownii.* It has very large trumpet flowers, the petals of which are reddish-brown on the outside. Very hardy. It requires good soil and flowers at the end of June. Height, about 2 ft.

Lilium bulbiferum.—Red flowers, slightly cottony on the outside of the petals, and forms small bulblets in the axils of the leaves. A dwarf variety flowering in June. Height, about 12 ins.

Lilium canadense.—The CANADIAN LILY, with attractive bell-shaped flowers of varying colour from yellow to orange, produced in July. Height, 3 ft.

Lilium candidum.—The well-known white MADONNA or ST. JOSEPH'S LILY.[1] Very hardy, but much resents being moved. Flowers are large, with broad white petals; given in June and July. Height, 4–5 ft.

Lilium carniolicum.—Red flowers, after the type of *Lilium chalcedonicum*, in July. Height, about 3 ft.

Lilium chalcedonicum.—The SCARLET TURK'S CAP LILY, one of the best of the Martagon type. Very hardy, and flowers in July. Height, 3–4 ft.

Lilium chalcedonicum maculatum.—This is an improved form of *Lilium chalcedonicum*, and very robust.

Lilium Columbianum.—Sometimes called *Lilium nitidum.* Flowers in July and August, bright golden with red spots. Height, 2½ ft.

Lilium coridion.—Flowers a beautiful shade of yellow, produced from June to July. Height, 1–1½ ft.

Lilium croceum.—Flowers superb orange. Splendid in cottage gardens. It blooms in June and July. Height, 3 ft.

Lilium dauricum.—A pretty yellow Lily dashed with red and spotted black, with flowers from three to six in an umbel, in June. Height, 2–3 ft.

Lilium elegans.—A very attractive sort with brilliant-coloured, cup-shaped blooms in May and June. Height, 12–24 ins.

Lilium excelsum.—Syn. *Lilium testaceum*, which see.

Lilium giganteum (NOBLE HIMALAYAN LILY).—Flowers white, streaked with purple inside, given in July and August. This sort has very handsome foliage. When soil is good, it grows about 10–14 ft. high. Hardy and well adapted for woodland planting.

Lilium Hansoni.—Golden-yellow, with black spots. Good for pot-culture. Hardy. It blooms in July. Height, 3–4 ft.

Lilium Henryi.—Flowers August and September. Lovely orange shade, with deep green foliage. Height, 6 ft., or more.

Lilium japonicum (Syn. *L. Krameri*).—An unusual pink and very beautiful Lily. It blooms from July to August. Height, 2½ ft.

Lilium longiflorum.—This is the old TRUMPET LILY, not much grown.

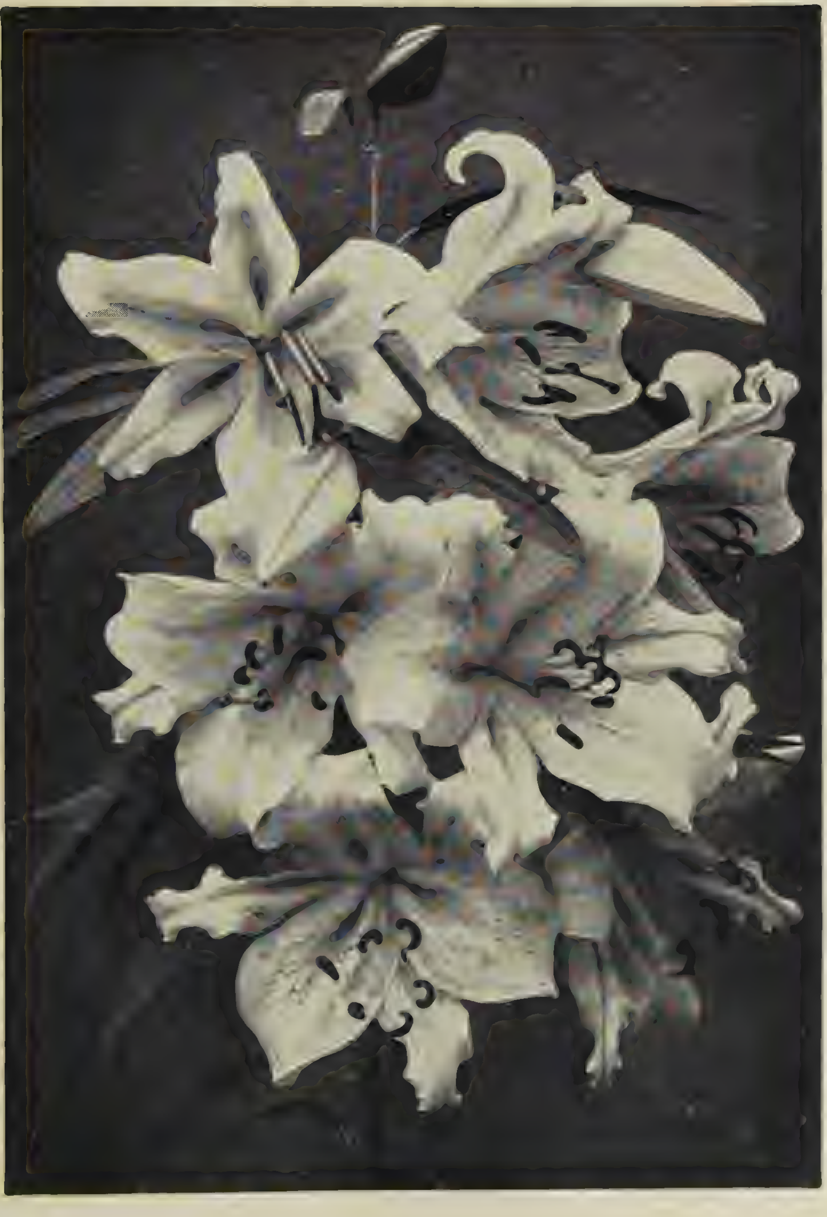
Lilium longiflorum eximium (BERMUDA EA TER LILY).—A Lily bearing large white flowers in July and August. Height, 2–3 ft.

Lilium longiflorum formosanum.—A white Lily which flowers in July. Height, 3 ft.

Lilium longiflorum giganteum.—An especially good plant of free growth having many flowers, which

---

[1] The Kew Authorities give BOURBON LILY as the English name for *L. candidum.* Very few gardeners know it by that name, however.—EDITOR.



LILIUM AURATUM PLATYPHYLLUM

last well when cut. Colour white, and blooms in August. Height, 2–3 ft.

Lilium longiflorum Harrisii.—This Lily is recommended as superior to the variety *L. l. formosanum*, as it can be forced better. Colour white, and blooms in June. Height, 1½–2 ft.

Lilium longiflorum Marhan.—A lovely hybrid Lily, orange, with streaks and spots of red-brown. It blooms in June and July. Height, 7 ft., when established.

Lilium Marhan Ellen Willmott.—A more robust form of *Lilium longiflorum Marhan.*

Lilium Martagon.—This is the MARTAGON LILY of gardens and the TURK'S CAP LILY of Kew, of which there are many forms.

Lilium Martagon dalmaticum.—Light to dark purple flowers in July. Height, 5–6 ft.

Lilium monadelphum.—Golden-yellow reflexed flowers; pollen bright scarlet. It blooms in June. Height, 3 ft.

Lilium monadelphum szovitsianum (*Colchicum*).—Clear straw yellow, spotted with black, rich brown anthers. It blooms in July. Height, 3–5 ft.

Lilium pardalinum (PANTHER LILY).—From California, and one of the most beautiful of hardy Lilies. Flowers in July, bright orange, spotted dark crimson. Height, 2–2½ ft.

Lilium Parryi.—A distinct Lily of a beautiful citron yellow, spotted with light chocolate brown. Lovely perfume. Flowers in July. Height, 3–4 ft.

Lilium pyrenaicum.—The YELLOW TURK'S CAP LILY. Flowers yellow, spotted black, in May and June. Height, 2 ft.

Lilium speciosum album Kraetzeri.—Pure white, with band of green down each petal. It blooms in August and September. Height, 3 ft.

Lilium speciosum magnificum.—A new Japanese variety rich ruby carmine, margined white. Spikes grow from ten to twenty flowers. It blooms in September. Height, 4 ft.

Lilium speciosum Melpomene.—Dark crimson purple with white; free flowering, and blooms in September. Height, 4 ft.

Lilium speciosum roseum and rubrum (Japanese).—Rose-coloured flowers, varying in depth of shade. Several varieties are found among these. All bloom in September. Height, 3 ft.

Lilium sulphureum (Syn. *Wallichianum superbum*).—This has tubular-shaped flowers, yellow inside, rosy-brown outside. It blooms in September. Height, 6 ft.

Lilium tenuifolium.—Bears many bright scarlet flowers in June, and is very graceful. Height, 1½ ft.

Lilium testaceum (Syn. *Lilium excelsum*).—A very free blooming hardy and stately Lily for any soil, with beautiful yellow flowers in June, on plants 2½ ft. high.

Lilium thunbergianum sanguineum.[1]—Vigorous and early, with light red flowers, and black spots, in May and June. Height, 1–2 ft.

Lilium tigrinum.[2]—The old species (*sinensis*). Richly coloured flowers. Grows well among grasses if the roots are not allowed to become too dry. Colour, orange. It blooms in June and July. Height, 4 ft.

Lilium tigrinum splendens.—Fine flowers, large spots, very high coloured. Makes a grand display during August. Height, 5 ft. An improvement on *Lilium tigrinum.*

---

[1] The species *thunbergianum* is referred to *Lilium elegans* at Kew.—EDITOR.

[2] This is popularly known as the TIGER LILY.—EDITOR.

Lilium umbellatum.—Syn. *Lilium dauricum.*

Lilium Wallaceii.—A splendid graceful variety for August. Rosy and apricot tinted; thickly spotted. Requires moisture. Height, 2–5 ft.

Lilium washingtonianum. — A species from California, with long panicles of flowers; very fragrant. Colour, white to lilac. Flowers in June and July. Height, 4–5 ft.

E. H. H.

NEW SPECIES.

Lilium Biondii.—This has bright orange flowers, which are speckled with black.

LILIUM.—See *LILIES.* See also under LILY in *WATER GARDEN: PLANTS FOR THE.*

LILY LEEK (*Allium Moly*). — See *ALLIUM.*

LILY OF THE INCAS (*Alstroemeria pelegrina*).—See *ALSTROEMERIA.*

LILY OF THE VALLEY (*Convallaria.* Nat. Ord. Liliaceæ).—Everyone knows and appreciates the small white, drooping bells of the Lily of the Valley. With the lapse of years numerous varieties or forms have appeared, but none is sweeter or more charming in every way than the native wildling of our British woods.

Culture: (*a*) UNDER GLASS. — The perfecting of cold storage has enabled what are called "retarded crowns" to be put on the market practically all the year round, and has very much simplified the cultivation of these flowers under glass, as they may be had in bloom at any time in boxes or pots. The first essential is to start them in a cold frame, and to give them very little heat at any period of their growth. The "crowns" may be planted 1 in. apart, the roots being carefully covered with soil so as to leave no air spaces, and the actual crowns or tops left sticking up bare. Darkness is essential at the start. An inverted flower-pot, or heavy shading the glass of the frame, will accomplish this. A temperature of from 60–65° F. is sufficient for these retarded crowns. With regard to ordinary crowns, the English and so-called Berlin strains are the best, and may be boxed or potted from autumn onwards. It is said that a touch of frost in some way makes them more amenable to early forcing, hence it is well to untie the bundles of crowns when received and put them in by the heels until wanted. The first batch may be started about mid-November, but unless a steady bottom heat of 75–80° F. can be had it is far better not to attempt to flower them until much nearer their proper time of blooming. January will be quite soon enough to begin to pot up batches, which may then be placed in warmth (bottom heat if possible) at once, and kept in the dark until they are well on the way to bloom, when light must be gradually admitted and the plants hardened off.

(*b*) OUT OF DOORS.—Either clumps or crowns may be used, and should be planted in a light rich soil, if possible in partial shade, although they grow quite well in the open if the position is not too hot. To ensure a succession of bloom use should be made of different positions, *e.g.* the two sides of a wall running N.E. to S.W. The wild native woodland form is very charming when introduced for this purpose into good garden soil. The writer knows a garden where there are splendid beds of these on the two sides of a fruit wall in a kitchen garden. An annual top-dressing of leaf-mould and rich old rotten manure is of great benefit to permanent beds. These need not be removed until the growing poverty of bloom gives warning that the time for this operation has come.

Varieties or Forms.—The BRITISH WILD LILY OF THE VALLEY (*Convallaria majalis*) is probably the original type. It is much smaller than *Convallaria Fortin*, which is a new and desirable variety.

"Berlin" and "Dutch" crowns or clumps signify a form between our native wild Lily of the Valley and *C. Fortin*. They are quite large enough to be pleasing. These are what are usually planted in gardens.

A double form and a pale pink or flesh-coloured form are sometimes offered in lists.—J. J. & E. T. E.

See also *MEDICINAL HERBS*.

LILY: Water Garden Species.—See *WATER GARDEN: PLANTS FOR THE*.

LIMACIDÆ.—See SLUGS AND SNAILS in *INSECT PESTS*.

LIME.

The word lime does not mean anything much to chemists, for it is a vague word. To gardeners, however, it means a great deal—it may mean success or failure of their crops; but, alas, to them also it is a word of somewhat vague meaning.

Strictly speaking, lime should mean oxide of the metal Calcium; but it may mean slaked lime, *i.e.* water-slaked lime or air-slaked lime. Water-slaked lime is Calcium hydroxide, and air-slaked lime is a vague mixture of Calcium oxide, Calcium carbonate, or Calcium hydroxide. Flour-lime may mean extra pure Calcium hydroxide or Calcium oxide; conversely it may also mean ordinary commercial lime (often full of impurities, such as clay, etc.), which has been ground to the form of an impalpable powder. Lime-powder may mean ground chalk or ground limestone. Ground garden lime may mean ground quicklime, slaked lime, or even finely ground magnesian, or Derbyshire limestone. Spar-lime is generally finely ground calcite spar, but it may also mean a mixture of ground heavy-spar (sulphate of barium) and calcite, which will prove injurious to crops. Alabaster and Gypsum limes are usually finely ground sulphate of lime.

Lime and its Uses.—We have very little faith in the various brands of patent lime there are now on the market. Most of them are charged at fabulous prices, and the gardener is strongly advised to keep rigidly clear of them, or at least only to use them for small experimental work, unless he has a fortune to spend upon the garden. The best lime we know of is obtained by burning the Derbyshire or Yorkshire Mountain Limestone, so largely quarried in the Peak District and in North-West Yorkshire. Next best is the lime obtained from burning chalk from the Downs. The lime obtained by burning brashy Jurassic or Tertiary limestones is very inferior, and should not be used if other is available. Magnesian Limestone, known to geologists as Permian Limestone, does not make good material for the garden, nor does the Limestone found in thin bands between the New Red Sandstone. Yorkshire and Derbyshire Mountain Limestone are renowned for their purity, and so should be used if possible.

With rare exceptions it is far better to buy lime in the form of freshly burnt lumps unbroken as they come from the lime kiln. Ground quicklime and flour-slaked lime are awkward to manage; the former is apt to burst its bags by absorbing atmospheric moisture, and as great heat is produced during the absorption the bags may char.

Both the materials unless stored in extra thick bags greedily absorb carbon dioxide from the atmosphere, and this means that their value is much reduced. When a piece of quicklime is put into a saucer of water it should at once start to crack and swell, giving off steam and falling to a fine powder. If it does not do this, either it has been burnt very badly, or it has absorbed so much carbonic acid gas from the atmosphere that the lime has become chalk. In any case it is not much use on a heavy soil where active quicklime is wanted. The amount of carbonate (which should never exceed 2 per cent. in any fresh sample) may be estimated roughly by weighing a sample, and weighing a dish containing dilute hydrochloric acid. Add the lime. Cover with a weighed watch-glass and allow to stand. When action has completely ceased weigh again, subtract from total weight, and you have weight of gas given off. Calculating amount of gas given off to be 44, add 56, and you have the weight of carbonate of lime in the sample. As to storing either lump or ground quicklime or slaked lime we do not advocate bags, unless the material is to be used almost immediately. We prefer to use closed barrels or deep tightly lidded boxes. If neither is available, make the lime into a heap in a shed and cover with a thick layer of dry earth, beating the surface hard. Once the lime is slaked the gardener cannot transform it again into quicklime, for though he may heat it in the ordinary way he cannot drive off all the water it has so greedily absorbed. Lime would want "burning" again before it could be transformed into its "quick" state, and this the gardener cannot do.

Well, now, about the use of lime. Gardeners, we may say, use it for two purposes: firstly, for chemically sweetening the soil by acting upon poisonous humic acids which have accumulated, and breaking them up into simpler compounds; and secondly, for mechanically improving the texture of the soil.

Now, as regards the former purpose, the use of lime must be regarded as being a strictly chemical one. A soil which has been generously manured with dung for many years is full of plant-food, but the plant-food is in a sour, poisonous form. Despite the richness of the soil, good crops of vegetables or a wealth of flowers cannot be obtained, simply because this plant-food is not available or is in an extremely unpalatable condition. Apply lime to the land, preferably quicklime or freshly slaked lime, digging it in freely, and in a very few weeks the complex compounds will have been entirely broken down, all the poisonous acids will have gone, and in their place are left useful, soluble lime compounds. Instead of the soil being acid, it is alkaline, and since most plants can thrive best only in an alkaline soil, we see the need for keeping a watch upon the soil to see when the lime supply in it is running out. The well-known test for lime—viz., treating some of the soil with dilute hydrochloric acid and assuming that if there is any effervescence this is due to carbonate of lime, hence concluding in that case that no lime is needed—should be applied to the soil every season, since if not there is no method of finding out when lime is needed. Lime is not necessary on soils which are of a chalky or limestone nature, for they inevitably contain as much of it as they require. On light soils chalk is the right material to use (see later; also see article on *Chalk*).

As to the other action lime has, namely, that of improving the texture of the soil, this, though mostly a mechanical action, is not without its chemical side too. In a strong clay soil, for instance, the particles of clay are in an exceedingly fine state of division and very closely united; when such a soil is trenched and well limed, not one but two actions take place. First, the lime mechanically acts on the clay, making it granular and more workable; and secondly, the lime acts on it chemically, by breaking up the insoluble compound of double silicate of alumina and potash, turning out the potash and setting itself in place of it, thereby producing a double silicate of lime and alumina. This action of lime on clay soils is one of the utmost value to the gardener. What it means in a word is this: that when we want to give our clay soils a dressing of potash, which is very expensive, all we have to do is to give them a good dressing of lime, which is cheap. The potash is in the soil, and all we have to do is to unlock the door of the treasure-house by liming, and thus liberate the potash for our plants to feed upon.

The time to apply lime is an important question. Views on this point vary, but ours is that it is advisable to apply lime as a potash liberator when trenching clay ground as early as possible. If this work can be done in November, there should be a fine supply of potash available by the following March. Some people, however, fear to apply lime early, for they are afraid of losing some of the liberated potash. This seems a foolish idea. Clay soils are known to be retentive of moisture; thus the potash liberated cannot go far, and will in any case be within the reach of the plant's roots. As regards applying lime to sour land, *i.e.* land which may not be over-heavy but is full of humus, no good purpose can be served by using it earlier than the first week in February. In any case, the liming and digging should be completely done before the end of that month.

Some people say that lime can be applied at any time of the year. So it can, but there is not much gained by applying it to land after the crops have already been sown or planted, except in the case of using it for protecting them from slugs and snails. Lime must not be regarded as a stimulant as is sulphate of ammonia, for it is nothing of the kind.

Certain plants do not like lime. This applies to many shrubs, which are much injured by the use of it, also to certain rock plants and wild garden flowers. Generally speaking, it is a safe rule to go upon that plants which enjoy a peaty soil do not like and should never have lime. [The chief plants which dislike lime are mentioned in our article *Lime-Haters*.—Editor.]

When artificial manures, such as sulphate of ammonia and superphosphate of lime, are freely given to plants or crops, lime should in every case be applied early the following spring; for these two artificial fertilisers use up enormous quantities of lime, as they are what are known as "acid" fertilisers. The "after effects" from using these fertilisers, which are often so bad, would never be noticeable if lime were freely used upon the soil.

It was mentioned earlier that quicklime or slaked lime are not suitable for use on sandy soils, and that chalk is the right material to use. Why so? The reason becomes evident after a moment or two of consideration. Lime itself has a destructive action—we saw that it broke down the harmful acids in sour soils and the clay in strong soils, making them in each case into simpler compounds. In a sandy soil we do not require this destructive action: it is usually a matter of considerable difficulty to get any manure to remain "held" in the soil. What we want is a material with a "constructive" action, namely, something which will help to bind the particles of soil together, and help to hold the manure in the soil. This material is supplied by ground chalk, or better still, by powdered chalk-marl. These materials, applied in November, December, or even February, will do much more for the soil than ordinary lime could ever do, on account of the extreme difference of their action.

"Lime and animal manure should never be applied together." This old maxim, so often given, is seldom explained, and the average man asks, "Why?" To see why, he should scatter some freshly ground quicklime over some hot stable manure and then smell the strong ammonia which is given off. Every whiff of that ammonia means waste of plant-food; so the answer to the question above is, "Because one spoils the other."

Likewise, when mixing artificials together lime should be kept out of the way. Lime will drive all the ammonia out of salts, such as nitrate, phosphate, and sulphate of ammonia, replacing the base by itself and forming calcium phosphate, sulphate, and nitrate. With superphosphate lime has a rather different action. This fertiliser owes its solubility and its value as a plant-food to the fact that there is an excess of phosphoric acid in it far over and above the amount of acid needed to form a normal neutral phosphate of lime. The last-named salt is wholly insoluble in water and hence valueless for plant-food. Now, when superphosphate of lime and quicklime are mixed they act on each other and normal phosphate of lime is produced, which means that by mixing the two we are making a compound which is absolutely useless.

Lime should, however, be mixed with wet fresh vegetable refuse which we want to get decayed very quickly, for here its destructive chemical action is valuable. It is, however, a great mistake to mix it with leaves to hurry their decomposition, unless it is known for certain that they are to be used only for such plants as like lime.

Besides being used as a soil sweetener, etc., as mentioned, lime also finds other uses in the garden. It can be used for making lime water (see under CALCIUM HYDROXIDE).[1] Also it is freely used for making whitewash (see *ibid.*). As a shading for the glass of frames and greenhouses, there is nothing so good as painting the glass with a wash made from slaked lime or carbonate, and we might mention other uses.

Application of Lime.—We have now very briefly covered the ground taken under the heading of Lime. In this brief sketch we have tried to convey in a few simple, carefully chosen words, what other writers might require much more space to do. The subject of lime is a truly fascinating one, and such that plenty of original work awaits the man who cares to take the trouble to do it.

---

[1] This is regarded as a definite chemical compound, and as such it is treated in the next article.—EDITOR.

Work of this kind will well repay the hours spent on it.

Just a closing word about the application of lime. The rate of application varies with soil and season, but a safe early winter application is 8 oz. per sq. yard, and a safe early spring dressing 4 oz. per sq. yard. The lime lumps will slake themselves, and immediately they have fallen they should be dug in. For the amount of chalk to apply, see article on *CHALK* and notes on CALCIUM CARBONATE to follow.—E. T. E.

LIME COMPOUNDS.

Probably the lime compounds are more useful than are any others to the gardener. They are of many and varied natures, active and inactive, pleasant and unpleasant, as the following notes will show.

CALCIUM CARBIDE.—This in its fresh state is a grey, hard, lumpy material, which emits acetylene gas in contact with moisture. It is a powerful soil fumigant. Holes are made in the ground about 9 ins. apart each way and 9 ins. deep. Into each of these holes a little piece of the carbide is put, and immediately the holes are filled in. This should be done in the winter about the second week in November.

Calcium Carbide Refuse is the residue from lamps which are used for burning acetylene gas. It is more useful than the fresh carbide, and, like lime, is easy to apply. It is really a mild "gaslime." Used in the early winter, at the rate of 12–16 oz. per sq. yd., and dug in at once, it efficiently clears the soil of pests. It can be applied in the spring also, but if this is to be done it should be spread on the ground for a week and then dug in.

CALCIUM CARBONATE.—This is a useful material in many ways. The pure substance is known as precipitated chalk and is made in the process of making nitrate of potash by double decomposition with nitrate of lime (see CALCIUM NITRATE). Ground limestone is another form of it. This is a mild lime, and can be applied to sandy or acid soils with great advantage. It can be mixed with rotting vegetable matter to keep the whole sweet, and then the waste involved by mixing quicklime with it does not take place.

Ground chalk often contains impurities, and is regarded as an inactive and useless material for the gardener. On the contrary it is very useful, since it serves, as we saw in the article on *LIME*, to bind the material together if applied to light friable soils, thereby helping to prevent manure and plant food from being washed through into the subsoil and lost.

Lump chalk should be put on at the rate of 42–60 lb. per sq. rod early in November, and the weathered material dug in during the month of February.

Precipitated chalk can be freely mixed with potting soils, except for peat-loving plants, which do not like lime. It can be mixed with napthaline and other chemicals, and the material dug in as a soil fumigant. When in the special form known as "Whiting," it can be used for whitewashing. Mixing it with glue produces a milk which can be painted on glass to shade off too much sun. It and finely-ground limestone is invaluable for use in reclaiming peat lands for general crop cultivation.

CALCIUM CHLORIDE.—This is not of much use for outdoor work on the land, except as a means of conserving moisture. One oz. per sq. yd. in the spring will greatly help to keep the soil damp throughout the season, provided, of course, that the chemical is not at once washed through into the subsoil. In the greenhouse it is very useful in winter weather for absorbing damp, and drying the atmosphere up. Pans of the chemical in lumps are put about the house, and when the chemical has dissolved in the water it has absorbed, the pan is merely put into the kitchen oven and the moisture evaporated off. The chemical can be used again and again.

CALCIUM CYANAMIDE.—When we refer to this, very often people think we are saying Calcium Cyanide. This is not the case. Cyanide of lime is poison, as are all cyanides, but Cyanamide of lime or calcium is a valuable plant food. It is made from calcium carbide, by passing nitrogen over the heated chemical, and in contact with water it evolves not acetylene gas but ammonia gas. The gas is given off slowly, and this makes it a lasting fertiliser. Calcium carbonate or precipitated chalk is produced at the same time.

Cyanamide is useful for all plants which require nitrogen either in a mild or active form. Root-crops benefit considerably as well as surface leaf crops by its use. It should be got on the land in the spring, a few weeks before sowing or planting, in order that its ammonia may be liberated. We may point out that up to the present the theory of scientists is that plants cannot absorb ammonia direct, but that it must first be changed by soil bacteria into nitrates. For this purpose lime is essential, and is supplied at the same time by cyanamide.

CALCIUM FLUORIDE is better known as Fluor Spar, and is useful for decorative purposes in the rock garden, for it is a glorious sky-blue in colour, almost as lovely as Labradorite in fact. It is of no use as manure, but as a source of hydrofluoric acid (see article on *Acids: Their Uses in Horticulture*) it is very valuable. The Blue Border (see article *Colour Gardening—Single-Colour Beds*), can, by the way, have its path spangled with fluor spar to improve its effect; for the spar is very cheap in Derbyshire.

CALCIUM HYDROXIDE.—This is slaked lime, a burning corrosive powder injurious to skin and clothes. Milk of lime is simply a mixture of slaked lime with water, made the consistency of skim milk. Lime water is made by putting a few ounces of slaked lime into a gallon of water, stirring up, and filtering, using the clear liquid only. Limewash is made from slaked lime also. Milk of lime can be used for softening temporarily hard water. Lime water is used for sweetening sour soil round the roots of pot plants, and for driving worms out of the soil in pots.

Calcium hydroxide readily absorbs carbon dioxide from the atmosphere, producing calcium carbonate. Slaked lime can be put on the land at the rate of 8 oz. per sq. yd. in November or February. It is much too active to be mixed with animal manures, and, like quicklime, it should on no account be mixed with sulphate of ammonia, superphosphate of lime, or any ammonia salts.

CALCIUM HYPOCHLORITE is better known as chloride of lime. It is prepared by passing chlorine over slaked lime. It is not of much use for the soil except as a cleanser. It will certainly kill pests, but it should be applied early, so that the poisonous chlorine may become disseminated before the crops are put in. About 1 oz. per sq. yd. is an exceptionally safe dressing to apply, but three or four times this amount may be used.

CALCIUM NITRATE is a chemical of great importance. It is manufactured by cheap water-power and electricity in Sweden, by uniting the atmospheric nitrogen and oxygen, dissolving the gas in water and adding broken limestone. It is an exceedingly useful, soluble, nitrogenous manure, directly absorbable by plants; it is,[1] or was cheap, and hence can and should be widely used. Plants seem to love it, and although it is far more suitable for surface "leaf" crops, such as cabbages, spinach, etc., etc., very successful results have been attained by applying it to root-crops such as beet, carrots, parsnips, salsafy, and scorzonera which it is desired to hasten on in growth. About ½ oz. per sq. yd. can be applied once or twice during the growing season and hoed in, or ½ oz. per gallon of water occasionally will prove a useful liquid stimulant, but it must be kept off the leaves, or even at that strength it may burn them. Nitrate of lime is apt to absorb atmospheric moisture and dissolve itself therein, hence it must be stored in tightly-lidded tins or barrels.

Besides its direct uses, calcium nitrate has some very interesting minor uses. The important fact to remember in connection with it is that it is soluble in water, but other compounds of calcium, such as the sulphate and carbonate, are insoluble. Hence we can use it for "double decomposition" purposes, as chemists say, which means that we can use it for making one compound from another. This is specially useful in the case of potash. As is well known, carbonate of potash is cheap. Nitrate of potash is dear and very awkward to get for gardening purposes at any time.[2]

Nitrate of potash is, however, very much more useful to the gardener than carbonate of potash, or even sulphate of potash, so we proceed to turn carbonate of potash into nitrate of potash. This is easily done as follows:—A strong (nearly saturated) solution of carbonate of potash in hot water is prepared, and at the same time an equally strong and equally hot solution of nitrate of lime is made in another vessel. The two solutions are then mixed, stirred, and boiled. White precipitated chalk separates out. This is filtered off. More of the nitrate of lime is added in very small quantities until no further chalk is thrown down, and the solution is boiled away rapidly to about a quarter and cooled suddenly. Nitre separates out. The solution is then boiled down by about half, and again cooled suddenly. More nitre settles down, and this, with the former, is dried. The solution is then evaporated to dryness, and the nitre stored in tins till required for use. For amounts to apply, see POTASSIUM NITRATE in article *POTASH AND POTASSIUM COMPOUNDS.*

Again, we said that nitrate of potash was more useful than sulphate of potash, did we not? In the same way as that described above, nitre can be made from sulphate of potash and nitrate of lime, since sulphate of lime is not soluble.

Nitrate of lime can also be used for making nitrate of potash out of fresh wood ashes. For this purpose the ashes are heated with hot water, and then, after filtering, a hot solution of nitrate of lime is added. Carbonate of lime is thrown down as before, and after the solution has been again filtered it is evaporated down as before.

---

[1] This article was written during the European War, 1914–18.

[2] During the War, nitrate of potash for this purpose could not be obtained for love or money.

CALCIUM NITRIDE would, if it were put on the market cheaply, be a most valuable fertiliser, and would soon supersede cyanamide. At present it is a chemical curiosity, and not in any manure merchant's list.

The other nitrides are prepared by passing nitrogen over heated metals, and surely nitrogen is cheap enough when four-fifths of the atmosphere consist of it. As is well known, calcium metal is easily made by electrolysis, and so there seems little excuse for urging attention to this chemical. The nitride would be a companion to calcium carbide, for the carbon in the carbide would be replaced by nitrogen. It would, of course, evolve much more ammonia than calcium cyanamide does, and would, instead of producing calcium carbonate as a by-product, produce the more useful hydroxide as the carbide does. We throw out this suggestion to manure makers with the remark that someone must be sleeping somewhere, or this material would have been on the market before.

CALCIUM ORTHOPHOSPHATES.—As mentioned under PHOSPHORIC ACID, in the article *ACIDS: THEIR USES IN HORTICULTURE*, some of the calcium phosphates are insoluble in water and thus very little use to the gardener. Tri-calcium and Di-calcium Orthophosphates are probably the two best known; they are also the two least soluble. Mono-calcium orthophosphate alone does not appear in any manure maker's list we can find, but again it is the most valuable of all. Mono-calcium orthophosphate, with a large proportion of sulphate of lime (insoluble) and other impurities, is sold as "superphosphate," but superphosphate is of small value compared to the enormous value of the mono-orthophosphate. We were under the impression that we had handled a sample of this, made from bones, but are informed now that it too is at present a chemical curiosity on account of some technical difficulty in its preparation. We hope that garden chemists will get to work on this matter at once so that before a second new edition of this book is issued it may be available at 3d. per lb. Another valuable orthophosphate of lime is or may be called Nitro-calcium orthophosphate. This too is not on the market (for why we cannot understand, since it is highly valuable). It is obtained by dissolving bones or other insoluble phosphate of lime (preferably tri-calcium orthophosphate) in nitric acid, and since both calcium nitrate and mono-calcium orthophosphate are soluble in water, a manure of the highest value is produced. Many experiments remain to be made with pure mono-calcium orthophosphate and nitro-calcium orthophosphate, but readers are recommended to begin using either at the rate of ½ oz. per 2 gals. of water, and increase the strength gradually up to as much as ½ oz. per gallon.

Superphosphate of lime is very useful for many crops. It induces early maturity. It may be said to be useful for all the crops of the triad, namely, leaf, root, and seed crops. As it is an acid manure it is essential that plenty of lime be mixed with the soil, but on no account must lime be mixed with superphosphate, since if it is, all the mono-phosphate is changed into tri-calcium phosphate, which is insoluble. Nor should superphosphate be mixed with nitrate of soda or nitrate of potash, since a mixture reeking with nitric acid fumes will be produced—rank poison to crops.

Basic slag is another form of orthophosphate of lime. It is slightly soluble in water, and though it varies, the phosphate is in the form of the di-calcium-orthophosphate usually along with other impurities. Basic slag has many uses,—it is a good dressing for lawns, herbaceous borders, and general borders (4 oz. per sq. yd.), and for the vegetable garden it can be used at the rate of 6–8 oz. per sq. yd. In every case it should be applied very early in the winter, the sooner the better after the end of October. It must on no account be mixed with lime or ammonia salts.

Bones are another form of orthophosphate of lime, but as these are dealt with in a separate article we need not describe them here.

Of other phosphates, such as the Hypophosphates, Meta-phosphates, and Pyro-phosphates, there are great numbers, but as they are very little use to the gardener, we do not deal with them here.

CALCIUM OXIDE.—This (lime or quicklime) is fully dealt with in the preceding article.

CALCIUM SULPHATE.—This is dealt with in the article on *GYPSUM*, to which the reader is referred.

CALCIUM SULPHIDE.—In contact with damp, this blackish compound evolves sulphuretted hydrogen, a remarkably filthy-smelling gas. Calcium sulphide is of little use save for a soil fumigant, and though it is praised by some people for this purpose, we do not think highly of it, and would prefer something a little more powerful and sweet-smelling in character. This material is, however, exceedingly cheap; it can be obtained as a free gift from most soda works, and we understand that it is applied at the rate of about 2 oz. per sq. yd. Its use as a fungicide has been suggested, but is still in the experimental stage.

CALCIUM SUPERPHOSPHATE.—This is not a true chemical compound, but is a mixture of soluble mono-calcium orthophosphate, insoluble calcium sulphate, and other impurities. See under CALCIUM ORTHOPHOSPHATES above.—E. T. E.

LIME FOR STONE FRUITS.—See *ORCHARD: MAKING AND MANAGEMENT OF.*

LIME-HATERS.

There are many families of plants to which the presence of lime in the soil is a vital necessity, if they are to attain their highest development; in less degree the greater number of plants appreciate its value in releasing the "locked-up" fertilisers of the soil. But, on the other hand, there are some plants which can be called "lime-haters," for they will not thrive where lime is found in the soil, and even its presence in the water is inimical to their well-being. This class is, however, a small one; though the list is considerably extended if we include those plants which, while not refusing to grow in a calcareous soil, are certainly better where this element is absent. In making the rock garden it is especially useful to know what plants dislike lime, as the soil can be prepared to suit their particular requirements. With regard to the ordinary occupants of borders and shrubberies, the list is comparatively small; but there is a large section of greenhouse plants in which lime should be excluded from the compost. In the following lists the names of plants are those by which they are generally known and catalogued. They are not in all cases absolute lime-haters, but do best in soils free from lime.

Ferns.—Some of these require lime, some are indifferent, and others do poorly where it is present, preferring a peaty soil instead. Among the last-named class are the following: *Adiantum Capillus-veneris, A. pedatum*; Gleichenia in variety; Gymnogramme in variety; *Hymenophyllum tunbridgense*; Polypodium in variety; Todea in variety; and Trichomanes in variety.

Greenhouse and Stove Plants.—In this section the number of plants that do better without lime is fairly large, but as it is not usual to incorporate lime with the compost, there is little risk in most cases, although where the natural soil of the district is calcareous, it is advisable to procure potting soil from elsewhere. Among plants that may be so treated are the following: Acacia, Acalypha, Achimenes, Alocasia, Anthurium, Azalea, Bertolonia, Boronia, Bouvardia, Bromelia, Chorizema, Clerodendron, Columnea, Correa, Darlingtonia, Dillwynia, Dionæa, Dracæna, Drosera, Epacris, Eranthemum, Erica, Eriostemon, Gnidia, Hoya, Ixora, Leschenaultia, Lisianthus, Maranta, Medinilla, Monochætum, Nepenthes, Nidularium, Oxylobium, Pimelea, Plumbago, Rhododendron, Roella, Sarracenia, Sollya, Streptocarpus, Tetratheca, Tillandsia, Torenia, Tydæa, Utricularia.

Rock and Alpine Plants.—*Achillea ageratifolia, A. moschata*; *Androsace alpina, A. carnea, Z. Chumbyi, A. ciliata, A. foliosa, A. glacialis, A. imbricata, A. Laggeri, A. lanuginosa, A. obtusifolia, A. wulfeniana*; *Anemone baldensis, A. sulphurea*; *Artemisia glacialis*; *Asperula suberosa*; *Campanula alpestris, C. excisa*; *Cathcartia villosa*; *Caulophyllum thalictroides*; Claytonia in variety; *Conandron ramondioides*; *Coptis trifolia*; *Cortusa Matthioli*; *Dalibarda repens* (Syn. *Rubus Dalibarda*); *Daphne Genkwa*; *Deinanthe bifida*; *Dianthus glacialis, D. neglectus*; *Diphylleia cymosa*; Dodecatheon in variety; Douglasia in variety; *Eomecon chionantha*; *Epigaea repens*; Erica (except *E. carnea*, which does not resent lime); *Eritrichium nanum*; Erythraea in variety; *Gaultheria procumbens*; *Gentiana Penumonanthe, G. pyrenaica*; *Geum reptans*; *Haberlea rhodopensis, H. r. virginalis*; *Helionopsis breviscapa*; Hudsonia in variety; *Iris cristata*; *Jankaea Heldreichii*; *Jeffersonia binata*; Laurentia; *Linnaea borealis*; Lloydia in variety; *Loiseleuria procumbens*; *Lychnis alpina*; *Malvastrum coccineum*; Meconopsis in variety; *Menziesia caerulea*; *Mitchella repens, M. nudulata*; *Parochetus communis*; *Philesia buxifolia*; *Phyteuma hemisphaericum, P. pauciflorum*; Pinguicula in variety; *Primula hirsuta, P. viscosa*; Rhododendron (*R. ferrugineum* and *R. racemosum* are exceptions); *Saxifraga androsacea, S. Brunoniana, S. Hirculus, S. Seguieri*; *Scoliopus Bigelovii*; *Sempervivum arachnoideum, S. Gaudinii, S. Wulfeni*; *Silene Pumilio, S. rupestris, S. vallesia*; Sisyrinchium in variety; Swertia in variety; *Tanakaea radicans*; Thlaspi in variety; *Trifolium alpinum*; *Valeriana celtica, V. supina*; *Vancouveria hexandra*; *Viola pedata, V. valderia*; Wulfenia in variety.

Shrubs and Miscellaneous Plants.—Andromeda in variety; *Anemone nemerosa*; *Arctostaphylos Uva-ursi*; Azalea in variety; *Bruckenthalia spiculifolia*; *Bryanthus empetriformis*; Calluna in variety; *Calo-*

pogon pulchellus ; Clethra alnifolia ; Cornus canadensis ; Daboëcia (Syn. *Menziesia*) ; *Empetrum nigrum ; Epigaea repens ;* Erica (but *E. carnea* will thrive in chalky soil ; *Fabiana imbricata ;* Fothergilla ; *Gaultheria procumbens, G. Shallon ;* Kalmia in variety ; Ledum in variety ; *Leiophyllum buxifolium* (Syn. *Ledum*) ; Menziesia in variety ; *Oxycoccus macrocarpus, O. palustris* (Cranberry) ; Pernettya in variety ; *Philesia buxifolia ;* Pieris in variety ; Polygala in variety ; Rhododendron in variety (but *R. hirsutum* and *R. racemosum* can be grown on calcareous soil) ; Vaccinium in variety (including *V. Myrtillus,* the Whortleberry or Bilberry).—W. J. C.

LIME PLASTER.—See *MORTAR.*

LIME SALT WASH and **LIME SULPHUR WASH.**—See *INSECT PESTS : GENERAL METHODS OF DESTRUCTION.*

LIME SULPHUR.—See *SPRAYING MIXTURES AND FUNGICIDES.*

LIME TREE.—For the best sorts see under TILIA in *TREES.*

LIMESTONE.—See *ROCKWORK.*

LIMESTONE POLYPODY (*Polypodium Dryopteris Robertianum*). — See *FERNS AND FERN GARDENING.*

LIMING.—See *SOIL IMPROVEMENT.*

LIMNANTHEMUM (Nat. Ord. Gentianaceæ).—Only three species of this genus are at all generally grown. These, *L. humboldtianum* (Syn. *Villarsia humboldtiana*), *L. lacunosum,* and *L. peltatum* (Syn. *Villarsia Nymphoides*), which last is better known as the FRINGED BUCK BEAN, are all good hardy aquatics and may be grown in the usual way for water garden plants. They are easily propagated by offsets and spread rapidly. The first bears yellow and white flowers, while the second and third are pure yellow. All bloom in June or July, and average 3–12 ins. high.

LIMNANTHES (Nat. Ord. Geraniaceæ).—This includes two dwarf hardy annuals which are free-flowering and effective. They are easily raised from seeds sown in autumn or spring, and are of somewhat trailing habit.

Limnanthes alba.—This is a white summer flowering sort, growing 6 ins. high.

L. Douglasii.—This is a yellow and white sort which flowers freely in the summer and early autumn ; its variety *rosea* is pink. Both grow about 1 in. high.

LINARIA.—This pretty genus is described under its English name *TOAD FLAX.*

LINDENBERGIA (FIGWORT. Nat. Ord. Scrophulariaceæ).—This is a shrubby greenhouse plant, bearing bright yellow Mimulus-like flowers in great abundance. The leaves are egg-shaped, and the plant remains in flower three months. It is propagated by cuttings in the spring in slight bottom heat, and should be potted in light loam, peat, and sand. Temperature required, 50–55° F.

Greenhouse Species.—*Lindenbergia grandiflora.*—Yellow. Flowers from November to March. Height, 1–3 ft.

LINEAL MEASURES. — See under MISCELLANEOUS MEASURES in *WEIGHTS AND MEASURES.*

LING.—See CALLUNA in *SHRUBS.*

LINNAEA (TWIN FLOWER. Nat. Ord. Caprifoliaceæ). — Only one species of this genus is usually grown. This is a pretty trailing plant with wiry stems, suitable for moist shady situations. It is propagated by dividing the roots or by layering.

L. borealis.—This pretty plant has small round leaves on twiggy stems. Flowers fragrant rose-pink, in twos, on slender stems. Flowering Period, May to July. The variety *americana* has larger leaves and flowers.

Both it and the type average 3 ins. high.

LINOSYRIS.—Now included in the genus *ASTER.*

LINSEED.—See under FLAX in *MEDICINAL HERBS.*

LINUM (Nat. Ord. Linaceæ).

One member of this genus (*L. grandiflorum*) is a very popular annual in gardens, and deservedly so, as it flowers with the utmost freedom, is quite hardy, and grows freely from an outdoor sowing in spring. The plants are elegant and graceful; they are also quite useful for greenhouse decoration if grown in pots. Their flowers are rose-coloured, but there are also blue and crimson varieties, all of which flower freely in the summer or autumn. The height averages 6–12 ins.

Perennial Border Species. — *Linum perenne* (PERENNIAL FLAX) is a plant of very easy culture, and is useful in the herbaceous border. It bears blue flowers from June to August, and grows about 1½ ft. in height.

Rock Garden Species.—These are perennials of light graceful habit, suitable for open sunny places in the rock garden. They are propagated by means of cuttings in July or seeds in spring.

Linum alpinum.—A dwarf tufted plant with slender stems. Flowers blue. Site sunny. Soil sandy loam, gritty. Flowering Period, June to August. Height, 9 ins.

L. flavum.—A bushy plant. Flowers deep yellow. Site open. Soil loam. Flowering Period, June to September. Height, 1 ft.

L. salsoloides.—A slender-stemmed sort with narrow leaves. Flowers pale pink, with darker veins. Site sunny. Soil rocky. Flowering Period, June to July. Height, 9 ins. Its variety *nanum* is a dwarf compact kind only 4 ins. high.

See also FLAX in *MEDICINAL HERBS.*

LION'S EAR (*Leonurus grandiflora*).—See *LEONURUS.*

LION'S LEAF (*Leonotice Leontopetalum*).—See *LEONOTICE.*

LION'S TAIL (*Leonurus grandiflora*).—See *LEONURUS.*

LION'S TURNIP.—A name applied to *LEONOTICE*, which see.

LIPASE.—A ferment necessary for successful germination. See *GERMINATION OF SEEDS.*

LIQUID MANURING.—See *FEEDING PLANTS.*

LIQUIDAMBAR.—For the best species see *TREES.*

LIQUORICE.—See *MEDICINAL HERBS.*

LIRIODENDRON.—For the best species see *TREES.*

LITERATURE OF THE GARDEN.

The dawn of horticultural literature begins with the old Greek geoponic writers. In their works are to be found many useful and interesting references to the cultivation of plants and gardens.

The Romans, too, have contributed their quota in days gone by; especially worthy of mention are Cato, Varro, Columella, whose tenth book of *De Re Rustica* is a poem on gardens, and Palladius. The "Georgics" of Virgil may certainly be claimed as coming within our subject, for in them he treats of the culture of the vine and the olive. Pliny the Elder in his *Historia naturalis* has much to say about gardens and their occupants, but the space allotted to us for our subject precludes anything like a dissertation upon the writings of these old time authors. Translations of all of them can easily be procured if required.

There is a great gap in our subject between the fall of the Roman Empire and the revival of learning in the Middle Ages. Some famous works written in Latin and in manuscript made their appearance before the printing press became known. One of them in particular, by an author named Petrus de Crescentiis, entitled *Le Livre des prouffits Champestres et ruraulx*, richly illuminated, a French translation from the original Latin edition, sold a few years ago for the sum of £2600.

But for the modern gardener, whose interest lies chiefly in books of a less pretentious character, the literature of the garden here in England begins in the sixteenth century. To go beyond English horticultural literature would occupy more space than is possible, although it is curious that many of our early gardening treatises were admittedly translations from French and other foreign authors.

The first to be mentioned is *The Grete Herball*, the forerunner of a whole series of similar productions. They were partly medical, partly horticultural; herbs and simples, fruits and flowers with their curative properties, often more fanciful than real, were the distinguishing features of these early works. It is stated that the first edition of the *Herball* appeared in 1516, but none earlier than 1526 is now known. It was reprinted at intervals by one Peter Treveris, and was evidently either wholly or in part a translation from another famous book in French, *Le Grant Herbier*.

Next on our list is, of course, the famous *Gerard's Herbal*, which first saw the light in 1597, a second edition appearing in 1633. These old herbals like many other books on agriculture and allied subjects were not exclusively horticultural. The garden book pure and simple was a gradual and later development, and was, so to speak, evolved little by little as time went on.

It is no part of our purpose to fill this modest article with titles of famous books and the names of illustrious authors; it cannot be done. They are far too numerous, and so it will be of much greater service to the reader if we indicate sources of information upon such subjects as he may require. For Herbals, then, we recommend Mrs. Arber's *Herbals: Their Origin and Evolution* (Cambridge University Press, 1912), copiously illustrated with numerous reproductions of quaint woodcuts from many a famous old book difficult of access to the ordinary reader.

The next kind of book to which attention may be drawn is the agro-horticultural book, of which a large number appeared soon after printing became common. These will be found enumerated in most of the horticultural bibliographies; the cultivation of orchards and kitchen gardens largely occupied the attention of our English writers about the end of the sixteenth and the beginning of the seventeenth centuries.

Quite a number of them were translations from French and other Continental writers. Thomas Tusser, Thomas Hill, Leonard Muscall, Gervase Markham, William Lawson, Samuel Hartlib, Ralph Austen, being famous names at this period.

On the Continent, as we have already indicated, there were many eminent and capable cultivators who published important publications dealing with many phases of the gardener's craft. Estienne's *Maison Rustique*, of which more than one hundred editions were published in France, appeared several times in English. John Evelyn's *The French Gardiner* was a translation, as also was his *The Compleat Gardiner*, the latter originally written by the great Frenchman Jean de la Quintinye. A little later two famous French books were translated by London and Wise, well-known nurserymen in their day, and almost simultaneously by an anonymous translator. They were known in the originals as *Le Jardinier Solitaire* and *Le Jardinier Fleuriste*, but in the English editions they were both embodied in one volume and known as *The Retir'd Gard'ner*. This took place in 1706, and eleven years later a further edition of London and Wise's translation appeared by John Carpenter. An abridgment of the great La Quintinye's work was also issued by London and Wise in 1699, rapidly passing through several editions, and this kind of literary activity unquestionably contributed very largely to an extension of our horticultural knowledge in those days.

This brings us to the beginning of the eighteenth century. Gardening Literature had then begun to assume an importance far surpassing anything that had preceded it. Among famous names Richard Bradley, John Lawrence, Stephen Switzer, Batty Langley, John Abercrombie, Richard Weston—in whose work *Tracts on Practical Agriculture and Gardening* is to be found one of the first bibliographies of interest to the garden book lover—Sir Uvedale Price, and Humphry Repton, are worthy of mention in their respective departments of knowledge.

When we get well into the eighteenth century the name of Philip Miller, "Hortulanorum princeps" as he was called, curator of the Chelsea Physic Garden, looms largely before us. Besides his other writings, *The Gardener's and Florist's Dictionary*, a huge folio that ran into no fewer than eight editions, will for ever preserve his memory. There were other gardeners' dictionaries, such as John Dick's *The New Gardener's Dictionary*, fol. 1771, and Alexander Macdonald's *A Complete Dictionary of Practical Gardening*, in 2 vols., 4to, 1807, but all of these, except for purely antiquarian purposes, are now superseded by George Nicholson's modern work, *The Illustrated Dictionary of Gardening* and *Supplement*, in 5 vols., 4to.

It is just at this point that it seems to be useful to insert a few notes on some of the authorities on garden bibliography to which the reader may refer in case of need. For French horticultural literature there is probably no more useful work than the library catalogue of the National Horticultural Society of France and Georges Gibault's *Étude sur la bibliographie et la litterature horticoles et anciennes.* An excellent idea of German garden books can be got from Dochnahl's *Bibliotheca Hortensis*, which contains particulars of all such works as were published in Germany between the years 1750 and 1860.

Italian garden literature is not extensive; the best paper on the subject is to be found in Loudon's *Gardener's Magazine*, vol. xvi., 1840, p. 70, where *The Garden Literature of Italy* is very ably discoursed upon by Sig. Giuseppe Manetti.

The late William Paul, the great English rosarian, read a paper *On the Literature of Ancient and Modern Gardening* before the Royal Society of Literature in 1887. It will be found in his *Contributions to Horticultural Literature*, p. 532. There are, to choose only a few at random, bibliographical lists of more or less importance in *The Hortus Kewensis*, 2nd edition, 1813; Loudon's *Encyclopædia of Gardening*; Friend's *Flowers and Flower Lore*; Inigo Trigg's *Garden Craft in Europe*; but more strictly limited to purely English garden bibliography are the lists in Johnson's *History of English Gardening* and the Hon. Mrs Evelyn Cecil's *A History of Gardening in England.*

Unfortunately the last two do not go far beyond the third decade in the nineteenth century, since which period there has been an enormous influx of books on every conceivable subject connected with the many branches of horticulture.

In floriculture alone, to say nothing of the flower garden in general, there are hundreds of books, pamphlets, and treatises old and new. Special monographs have been published on every kind of florists' flower, the rose, dahlia, chrysanthemum, carnation, sweet pea, pansy, etc. What Pritzel's *Thesaurus Literaturae Botanicae* does for the Student of Botany, so the writer's *The Florist's Bibliography*, the only work of its kind, does for the literary lover of flowers. And a modern feature of floral Bibliography should here be mentioned, *i.e.*, the Year Books or Annuals of the various special Floricultural Societies, in which publications much statistical and other matter of interest to their members are to be found. John Parkinson's *Paradisi*, published in 1629, is about one of the first of florists' books, a modern reprint of which in facsimile can be had.

The art of garden design has been very fully dealt with from quite early times. Many and acrimonious are the discussions that have taken place in connection with this subject. Writers on various aspects of landscape gardening and garden planning are John James, who translated *The Theory and Practice of Gardening* from the French, George Mason, Horace Walpole, Thomas Wheatley, William Gilpin, Richard Steele, Sir Uvedale Price, Humphry Repton, John Claudius Loudon, and many others, without coming down to modern authorities. Their names constantly recur.

Not wholly remote from the last subject are garden poems. Some of these have been very famous and have achieved a degree of popularity that we can hardly understand to-day. Abraham Cowley's one on *The Garden* is reprinted to-day. Some, inspired no doubt by the "Georgics" of Virgil, may be briefly recalled. Rapin's *Hortorum, Libri IV.*, has not only been translated into French, but has found two English translators in the Rev. J. Gardiner and J. Evelyn. The Abbé Delille's poem *Les Jardins*, which has run into over a hundred editions, has also been translated into our tongue. Dr Erasmus Darwin, the grandfather of the great scientist, Charles Darwin, was the author of *The Botanic Garden*, a poem in two parts. Another one, *The English Garden*, by the Rev. William Mason, in four books, was first published in 1772. See also our article on *GARDEN POETRY*.

We are led imperceptibly in this

way to the modern development of the literary as distinct from the practical garden book. Nowadays there are so many, that a special classification is almost necessary to deal with them. Artistic printing and binding, the mechanical processes of inexpensive illustration both in colour and in black and white, have helped very materially towards an almost unrestricted output.

Only a few of the interesting literary garden books can be mentioned. We shall select those that the book lover may well place upon his shelves, to take down at quiet intervals, in leisure moments, to dip into, and thus taste the pleasures of the past. First of all comes Forbes Sievking's *The Praise of Gardens*, a choice collection of extracts from authors who have written about gardens, dating back to the days of the ancient Egyptians. Hazlitt's *Gleanings in Old Garden Literature* comes next. Then Ellacombe's *Plant Lore of Shakespeare* and Friend's *Flowers and Flower Lore.* If we dared to encroach still further on our space we might easily increase this meagre list, but we have yet other subjects to broach.

Pomology, Vine Culture, Vegetable Growing, Rock Gardening, Orchids, Ferns, Glasshouse Management and other branches of the gardener's art have practically libraries to themselves. Books on these subjects are innumerable, and in most cases the practical cultivator will only be concerned with the latest and most up-to-date edition. These are constantly changing and, being subject to revision, are outside the scope of our present purpose. Many of the great publishing houses keep in stock and can supply the latest editions of the most popular works of our great modern authorities on gardening subjects.

By the beginning of the nineteenth century ornamental as well as practical gardening had become an established art, and an eagerness had become manifest among its devotees to acquire useful knowledge in its various branches. The old ponderous tomes in folio and quarto were expensive and awkward, and ere long the development of serial or periodical garden literature was to become an established fact.

The Botanical Magazine was begun by William Curtis in 1787 and continues to this day. A coloured plate of a new or rare flower, with two pages of descriptive letterpress to accompany it, was the style in which it was brought out. *The Botanical Register* was very similar in style, and others followed, but periodical gardening literature as we know it to-day did not exist. The start was made when John Claudius Loudon, one of the greatest literary horticulturists we ever had, issued the first number of his *Gardener's Magazine* in 1826, and continued it to the day of his death in 1843.

This magazine was a most remarkable production in every sense of the word. Its contents were varied, embracing every department of horticulture and allied subjects; its contributors were eminent men living in all parts of the world; its influence was universal.

Loudon was a most prolific and voluminous author, a great number of important works issuing from his pen. His *Encyclopædia*, his *Arboretum et Fruticetum*, are monuments of patient toil. His wife after his death continued to revise and issue new editions of his and her own numerous works.

The Gardener's Magazine was shortly after its foundation followed by other monthly publications of a similar kind. Some were illustrated in a poor way with coloured plates most crudely done. *The Floricultural Cabinet*, edited by Joseph Harrison, appeared in 1833, and ran on until 1860 when it was merged in another, a weekly publication also called *The Gardener's Magazine.* Marmock's *The Floricultural Magazine* followed in 1836, and several others about the same time. *The Florists' Journal* was started in 1840. *The Florist*, which subsequently continued as *The Florist and Pomologist*, was first issued in 1848. *The Midland Florist* began in 1847, and so for a time these sixpenny or shilling monthlies answered the purpose of keeping the public up to date in the novelties of the day, the reports of the shows and the latest cultural devices. As time went on and education improved among the gardening fraternity, these old monthlies were not deemed to be sufficiently frequent in their appearance, and a demand for the weekly gardening press developed.

The Gardener's Chronicle was started in 1841, and still continues. Other weeklies followed, namely, *The Cottage*

Gardener, developing into *The Journal of Horticulture*; *The Gardener's Magazine*, long edited by Shirley Hibberd, a versatile and highly accomplished journalist; *The Garden*, a high-class weekly founded by William Robinson, well known for his work in horticulture. The cheaper but probably more popular penny gardening press was founded by William Robinson in *Gardening Illustrated*. Rival competitors soon followed, *Garden Life*, *Garden Work*, *The Gardening World*, *Amateur Gardening*, *The Gardener*, and others. The great war, however, resulted in the discontinuance of several of the latter-day weeklies.

It is proper to remark, before closing our paper, that another form of horticultural periodical has exercised a considerable influence on the public to whom it is specially addressed. We refer more particularly to the *Journal of the Royal Horticultural Society*, a veritable mine of inexhaustible horticultural knowledge on every conceivable subject directly and indirectly concerning the garden, the orchard, the greenhouse, and, in fact, all branches of practical and scientific gardening.

C. H. P.

LITHOSPERMUM (GROMWELL. Nat. Ord. Boraginaceæ).—This is a genus of sub-shrubby plants, mostly of prostrate habit. Sunny positions and well-drained sandy loam are essential for nearly all the species, which are propagated by cuttings in July and also by division in spring. The following are the best and are suitable for the rock garden:—

Lithospermum graminifolium.—This bears tufts of grass-like foliage and deep blue flowers. Site sunny. Soil gritty. Flowering Period, June to August. Height, 9 ins.

L. prostratum.—This forms a mass of twiggy stems covered with dark green leaves. Flowers gentian blue. Site sunny ledge or retaining wall. Flowering Period, May to September. Height, 4 ins. The variety *caeruleum* (Syn. *Heavenly Blue*) bears pale blue flowers.

L. purpureo-caeruleum.—This is a strong-growing trailer. Flowers red at first, turning to purple. Site, half-shade. Soil strong loam. Flowering Period, May to September. Height, 1 ft.

LITHOSPERMUM MILDEW.—See *DISEASES OF ROCK PLANTS*.

LITOBRACHIA.—Now included in the genus PTERIS, for which see *FERNS AND FERN GARDENING*.

LITTLE ERMINE MOTHS.—See *INSECT PESTS*.

LITTLE QUAKING GRASS (*Briza gracilis*).—See *ORNAMENTAL GRASSES*.

LITTORELLA (Nat. Ord. Plantaginaceæ). — The little dwarf-growing white-flowered SHOREWEED which many of us have been so pleased to find in damp sandy corners on the beach at the seaside is botanically known as *Littorella juncea* (Syn. *L. lacustris*). It does not succeed very well in inland gardens, so is best left where it is.

LIVER OF SULPHUR.—See POTASSIUM SULPHIDE in *SPRAYING MIXTURES AND FUNGICIDES*. See also POTASSIUM SULPHIDE in *POTASH AND POTASSIUM COMPOUNDS*.

LIVING FENCES.—See *GARDEN FENCES*.

LIVISTONA.—For the best species see *PALMS*.

LIZARD ORCHIS (*Orchis hircina*).—See note at end of *HARDY ORCHIDS*.

LOASA (Nat. Ord. Loasaceæ).

This is a genus which may well be dispensed with except in the largest collections. It contains many hardy and half-hardy annuals, as well as some half-hardy biennials and half-hardy shrubs, some of a trailing and climbing habit. Most of the plants have very poisonous properties, and sting the flesh violently when touched. Probably the best known species is *L. lateritia*, the CHILI NETTLE, a half-hardy red, May flowering climber, averaging 12 ft. or more in height.

LOBARIA.—Now included in the genus *SAXIFRAGA*.

LOBB'S ARBOR VITAE (*Thuya gigantea*).—See *TREES*. This species is now referred to *Libocedrus decurrens* and *Thuya plicata* by the Kew Authorities.

LOBB'S NASTURTIUM (*Tropaeolum lobbianum*).—See *CLIMBING AND TRAILING PLANTS*.

LOBELIA (Nat. Ord. Campanulaceæ). — Florists' section, half-hardy annuals and herbaceous perennials, 6–36 ins. high.

Soil.—Annual sorts succeed in ordinary garden soil. The Cardinalis varieties require light, but extremely rich, garden soil. Propagation is by seed, cuttings, and division, the first method being preferable for the annuals, and the other two for the herbaceous perennials.

Culture.—Sow the seed in March in slight warmth, pricking off as soon as the seedlings are easily handled, and plant out about the end of April or in May. If cuttings are wanted, the old plants should be potted up in autumn and placed in a cool greenhouse. During winter they must be kept fairly dry, otherwise they are liable to damp off. In February or March remove the young growths, and insert in sandy soil, where they will soon root.

USES.—The annual blue lobelia makes a useful and popular edging plant for summer bedding; it lasts long in bloom, and supplies a much-wanted colour amongst dwarf-growing flowers.

The cardinalis, fulgens, and syphilitica species and their hybrids are useful plants in borders where abundant moisture is obtainable, their brilliant colours and tall growth being very attractive in July and August. The roots require slight protection in winter.

Varieties. — *Annual.* — Crystal Palace compacta, Halley's Blue, Oxonion, Perle d'Azure.

Herbaceous.—Cardinalis, Crimson Beauty, De Breusen, Firefly, Gloire de St Anne's, Queen Victoria.

J. L. G.

LOBLOLLY, or LOBLOLLY PINE (*Pinus Taeda*).—See *TREES*.

LOBULARIA.—Now included in the genus *ALYSSUM*.

LOCUST ACACIA (*Robinia Pseudacacia*).—See *TREES*.

LOGANBERRY.—See *BRAMBLES AND BERRIES* and *BUSH FRUITS*.

LOISELEURIA (Nat. Ord. Ericaceæ).—A trailing shrubby plant, which thrives in sandy peat in a cool, moist position in the rock garden, and is propagated by cuttings in autumn. One species is in cultivation :—

Loiseleuria decumbens (TRAILING AZALEA).—A prostrate plant with wiry stems and small leaves. Flowers light purple. Flowering Period, June to July. Height, 3 ins.

LOLIUM (RYE GRASS. Nat. Ord. Gramineæ).—This is a genus of more importance to the farmer than the gardener. It is, however, used to some extent as a green manure crop, especially ITALIAN RYE GRASS, which is botanically known as *L. multiflorum* (Syn. *L. italicum*). Two other forms used to a more limited extent for the same purpose are DARNEL (*L. temulentum*) and RED DARNEL (*L. perenne*), of which a synonym is *L. linicolum*.

LOMARIA.—For the best species and varieties see *FERNS AND FERN GARDENING*.

LOMBARDY POPLAR (*Populus nigra pyramidalis*).—See *TREES*.

LONAS.—See *EVERLASTING FLOWERS*.

LONDON PLANE (*Platanus acerifolia*). See *TREES*.

LONDON PRIDE (*Saxifraga umbrosa*). See *SAXIFRAGA*.

LONDON PURPLE. — See *INSECT PESTS: GENERAL METHODS OF DESTRUCTION*.

LONDON ROCKET.—See *SISYMBRIUM*.

LONICERA.—For the best species see *CLIMBING AND TRAILING PLANTS* and *SHRUBS.*

LOOFAH.—See *ORNAMENTAL GOURDS.*

LOOPERS. — See under WINTER MOTHS in *INSECT PESTS.*

LOOSESTRIFE.—See *LYSIMACHIA.*

LOOSESTRIFE(*Lythrum*).—See *WATER GARDEN: PLANTS FOR THE.*

LOPHOLEPIS.—Now included in the genus POLYPODIUM, for which see *FERNS AND FERN GARDENING.*

LOPHOSPERMUM. — See *ANNUALS, HALF-HARDY: LIST OF.*

LORE OF THE GARDEN.—See *GARDEN LORE.*

LORETTE SYSTEM OF PRUNING.—See under SINGLE CORDONS in *CORDON FRUIT TREES.*

LORINSERIA.—Now included in the genus WOODWARDIA, for which see *FERNS AND FERN GARDENING.*

LOTUS (BIRD'S-FOOT TREFOIL. Nat. Ord. Leguminosæ).—The true Lotus is a modest plant as compared with the Lotus-flower of the East, of poets, and of mythology. Although this genus contains several hardy annual species, only one possesses real garden value, and this is *L. Tetragonolobus* (Syn. *Tetragonolobus purpurea*), which bears dark purple flowers from June to August, on plants 6–12 ins. high. It is quite hardy, and is easily raised from seeds sown in the open in early spring or late summer. The best site for it is a sunny position in the rock garden, where a light soil can be given it.

Hardy Perennial Species.—These are useful plants for banks and the less choice section of the rock garden. They may also be well grown in herbaceous borders. They require any ordinary moderately light soil in a sunny position, and are not difficult to propagate from cuttings inserted in July out of doors, or by division of the roots in the autumn or spring, at which time they may suitably be planted. We describe a few of the best species below:—

Lotus corniculatus (Syn. *L. crassifolius*).—A yellow August flowering sort, growing about 6 ins. high.

L. major.—Syn. *L. uliginosus*, which see.

L. maritimus.—Syn. *L. siliquosus*, which see.

L. ornithopodioides. — A yellow June flowering species about 6 ins. high.

L. pilosus.—Syn. *L. uliginosus*, which see.

L. siliquosus (Syn. *L. maritimus*).—A yellow June flowering sort about 4 ins. high.

L. tenuis.—A yellow sort blooming in July, which grows about 1 ft. high.

L. uliginosus (Syns. *L. major* and *L. pilosus*).—This also is yellow. It blooms in June, and grows about 18 ins. high.

LOTZEA.—Now included in the genus ASPLENIUM, for which see *FERNS AND FERN GARDENING.*

LOVAGE.—See *LEVISTICUM* and *LIGUSTICUM.*

LOVE APPLE (*Lycopersicum esculentum*).—See *LYCOPERSICUM.*

LOVE GRASS.—See *ERAGROSTIS* and *ORNAMENTAL GRASSES.*

LOVE-IN-A-MIST (*Nigella.* Nat. Ord. Ranunculaceæ).—Most of the hardy annual Nigellas make bushy plants, with their elegant foliage and interesting and showy flowers, if raised by sowing in the open in autumn, while later bloom can be secured by sowing seeds where the plants are to bloom any time in March or April. The plants have a strong objection to being transplanted, and instead of attempting this they should merely be thinned to a foot or more apart.

What to Grow.—*Nigella damascena*).— The popular DEVIL-IN-A-MIST, LOVE-IN-A-MIST, JACK-IN THE-GREEN, and JACK-IN-PRISON, so called because its blue flowers have green veiling. There is a white form, and the variety *Miss Jekyll* has large, double, deep blue flowers, and is fine for cutting. All flower from June onwards and average 1 ft. high.

N. hispanica produces blue flowers in the summer and autumn, and is 1½ ft. high; the variety *alba* has white flowers and brown anthers.

N. orientalis.—A species with yellow and red flowers, of no special merit as a garden plant, but a free bloomer from July onwards. Height, 1½ ft.

N. sativa[1] produces blue flowers all the summer. Its height is 1½ ft.

C. H. C.

LOVE LIES BLEEDING (*Amarantus.* Nat. Ord. Amarantaceæ).—The several members of the genus Amarantus referred to here are really half-hardy annuals, although, because of the hardiness of certain species in the warmer parts of the country, they are sometimes described as hardy. They are mostly of vigorous growth, and some are attractive by reason of their heavy, tasselled, drooping, and branched spikes of closely packed tiny flowers, while others have brilliant-hued foliage. All are strikingly effective in borders, and in conjunction with Palms and giant Reeds they produce a sub-tropical effect. They are best raised in gentle heat in March, potted separately at an early date in sandy loam, and kept under glass until May, when they must be gradually hardened off, preparatory to being planted in the open in June. A sunny, sheltered position is essential to success. Given rich soil, sunshine, and suitable supports, they range from 1½–4 ft. in height. The following are the principal species and varieties for garden use:—

Amarantus caudatus (Syns. *A. gracilis* and *A. pendulus*).—The popular Love Lies Bleeding, with velvety-purple flowers from July onwards. It grows about 2½ ft. high.

A. gangeticus (Syns. *A. japonicus* and *A. melancholicus*).—A sort bearing both crimson flowers and crimson foliage. It blooms freely from July onwards, and averages 1½ ft. in height.

A. Henderi.—A hybrid with carmine, orange, and olive-coloured leaves. It blooms from August onwards, and averages 1 yd. in height.

A. hypochondriacus (Syns. *A. bicolor* and *A. macrostachyus*).—This sort, the well-known Prince's Feather, bears deep crimson flowers and leaves with purple beneath; the variety *ruber* has crimson flowers and green and purple foliage. Both bloom freely from July onwards and average about 3½ ft. high.

A. paniculatus (Syns. *A. chlorostachys*, *A. cruentus* (Linn.), *A. incarnatus*, *A. sanguineus* (Linn.), *A. speciosus*, and *A. spicatus*).—A sort bearing red-tinted leaves and producing crimson-purple flowers freely from July onwards, on plants 1 yd. high.

A. salicifolius.—A species bearing bronze or orange leaves with insignificant flowers. The variety *Princess of Wales*, with orange yellow and green leaves, was once very popular. Both sorts grow about 1 yd. high.

A. tricolor.—This has purple, red, green, or yellow leaves. The variety *splendens* has crimson, scarlet, yellow, and green-coloured foliage. The flowers are insignificant. Both sorts grow about 3 ft. high. *A. tricolor* is sometimes accorded specific rank, but it is probably only a form of *A. gangeticus.*—C. H. C.

---

[1] The Black Cumin.—Editor.

NEW VARIETY.

Amarantus Dr Martin.—This has bright red upper leaves, bronzy lower leaves, and bright red stalks.

LOW BIRCH (*Betula pumila*).—See *TREES.*

LOW BLACKBERRY (*Rubus canadensis*).—See *SHRUBS.*

LOW BRAMBLE (*Rubus canadensis*). See *SHRUBS.*

LOW BUSH BLACKBERRY or **LOW BUSH BRAMBLE** (*Rubus trivialis*). See *SHRUBS.*

LOWBERRY.—See *BRAMBLES AND BERRIES.*

LOWER FUNGI.—See note on PHYCOMYCETES in *FUNGOUS DISEASES.*

LOWIARA.—See *ORCHIDS.*

LOXOSCAPHE.—Now included in the genus DAVALLIA, for which see *FERNS AND FERN GARDENING.*

LUBINIA.—Now included in the genus *LYSIMACHIA.*

LUCERNE (*Medicago sativa*).—See *MEDICAGO.*

LUCOMBE OAK (*Quercus lucombeana*).—See *TREES.*

LUDWIGIA (FALSE LOOSESTRIFE. Nat. Ord. Onagraceæ).—This genus, of which only one species (*L. palustris*) figures in the *Kew Hand-list of Herbaceous Plants*, is not of much value for the water garden or moist mixed border. It is named here to draw attention to the fact that it is not the true Loosestrife, though often at first glance one might take it to be. Examination of its flowers shows, however, that it belongs to a different and distinct natural order, namely, to that including the *EVENING PRIMROSE*, on which plant we devote a separate article. It may be regarded more as a moisture-loving, hardy, creeping, herbaceous biennial than as a true hardy aquatic, and bears yellow flowers in July.

LUNARIA.—See *HONESTY.*

LUNGWORT.—See *PULMONARIA.*

LUPINE (*Lupinus.* Nat. Ord. Leguminosæ) :—**Annual Sorts.**—These are scarcely less stately than the perennial species, and raisers have done much good work among them in recent years, thereby enriching our gardens considerably. The tall spikes of flowers, borne above elegant leafage, swaying gently in the summer breeze, at once suggest the peace and homeliness of a quiet country garden.

CULTURE OF ANNUALS.—Sow seeds in autumn or early spring where the plants are to flower; or in pots; pricking off and planting out at a very early stage. Choose a sunny site, and soil that contains a fair supply of lime. Some fine garden plants are listed under the name of *Lupinus hybridus.* Below is a selection of the best species to grow :—

Lupinus Cruckshanksii.—This fine plant produces blue and white flowers during the summer; possibly it is a variety of *L. mutabilis.* Height, 4 ft.

L. densiflorus (Syn. *L. Menziesii*). —A white and pink, summer and autumn flowering sort.[1] Height, 1 ft.

L. Hartwegii.—A pale blue, summer blooming sort. Height, 2½ ft.

L. luteus.—A yellow, summer flowering sort. Height, 2 ft.

L. Menziesii.—Syn. *L. densiflorus*, which see.

L. mutabilis.—A white and blue, summer flowering sort. Height, 3–5 ft.

L. nanus.—A lilac and blue, summer blooming species. Height, 1–2 ft.

---

[1] Often known as SHEEP POISON.—EDITOR.

LUPINE : Hardy Perennial Species. These include some of the finest of all hardy border flowers. Their free-flowering nature is well known, and their lovely spikes are a sight not to be missed. The Tree Lupines (*Lupinus arboreus*) are a different class of plant from the others ; these, as their name implies, are more like small trees than herbaceous plants when they are several years old.

CULTURE.—All the perennial Lupines thrive in any good, rich, well-drained soil in a sunny site, or indeed in a lightly shaded spot. The Tree variety is renowned for its power to bloom and grow freely on very poor land, though, needless to say, it does best if it has some food in the soil. Planting should be done any time from November to late February, taking great care that the long, thick, fleshy roots are not doubled up, but go down straight into the soil. Early staking is essential or the plants may be damaged. The dead spikes should be removed as soon as possible if further flowers are wanted, and the plants given suitable phosphatic or potassic liquid manure. Fertilisers containing nitrogen should not be used, as the plants belong to the Order Leguminosæ, and are thus able to get all they want from the atmosphere.

Propagation is simple if seed is sown, but difficult if division of the rootstock is attempted. Seed, which is easy to sow, and which usually germinates very freely, can be sown any time out of doors, or in a frame, from March to the end of August, and the seedlings pricked off and planted out in the usual way.

USES.—The Lupine, having the power of obtaining nitrogen from the air, is much used as a green manuring crop. Some varieties are used as cattle food. In the garden it finds its chief place in the herbaceous border, but may also be used in the wild garden or along the margin of the shrubbery. The spikes, which are often of considerable length, can be used for cutting, though they are not so good for this purpose as are other flowers.

What to Grow.—There are a large number of sorts to choose from. We recommend the following :—

Lupinus arboreus.—This flowers freely in June, often giving more bloom in the autumn, and ranges from 3–5 ft. in height. There are many good named sorts. *Daisy Hill* is pale blue, and *Snow Queen* is white. A yellow sort, *Luteus*, is also useful. Propagate by cuttings or seeds.

L. aridus.—An autumn flowering sort bearing purple and blue flowers. Height, 12 ins.

L. Chamissonis.—A useful blue, September blooming Lupine about 3 ft. high.

L. leucophyllus.—A species which is almost perpetual blooming, as it often opens in late May and continues until the end of the autumn. Its flowers are pink, and its height varies from 2–5 ft.

L. littoralis.—This succeeds in seaside gardens. It blooms all the summer, and its flowers are purple or purple-blue. Height, about 1 ft.

L. nootkatensis.—A blue and white species, blooming in May and June. Height, 1 ft.

L. polyphyllus.—This is the border Lupine of which we are all so fond. It will start flowering in early seasons about 15th May, but is at its best early in June, and will flower again, if well treated, in the autumn. Its height varies from 2½–5½ ft. There are numerous named varieties : *Albus* is white ; *Caeruleus*[1] is blue; *Foxii* is blue and white; *Giant Purple* is purple, as its name implies; *Moerheimi* is pink, and probably the most attractive of all; *Purple King* is best described as a rich purple, and *Purple Queen* is similar; *Roseus*[1] is an attractive rose-pink; *Somerset* is a fine yellow, and *Sulphur Queen* is yellow.

---

[1] Popularly known as the BLUE LUPINE.—EDITOR.

There are many more species and varieties of Lupines which are very attractive. The enthusiast should visit a good botanical garden in June and September if he wants to fill his notebook with their names.

LUPINUS.—See *LUPINE.*

LUTEOLA.—Now included in the genus *RESEDA.*

LUZULA (WOOD RUSH. Nat. Ord. Juncaceæ).—This is a genus of Rush-like plants not unlike *JUNCUS*, on which we devote a separate short article. They are of very little garden value, but may be used in the moister portions of the wild garden or on stream sides. Numerous species have been described, and nearly a dozen are mentioned in the *Kew Hand-list of Herbaceous Plants.* Of these, *L. Fosteri, L. Hostii* (Syn. *L. flavescens*), *L. maxima* (Syn. *L. sylvatica*), and *L. vernalis* (Syn. *L. pilosa*), are fairly well known. *L. campestris*, the CUCKOO GRASS, is probably the best known species of all, but none of these species are plants of much beauty.

LYCASTE.—See *ORCHIDS.*

LYCHNIS (CAMPION, CATCHFLY, etc. Nat. Ord. Caryophyllaceæ).—This genus comprises numerous annual, hardy herbaceous, and rock plants. The annuals are, in our opinion, of little importance compared with the others. Both the Perennial Border Species and the Rock Garden Species may be increased by seeds sown in the usual way in March, or by division in the autumn or spring. They are of easy culture, thriving in good light, ordinary garden loam. The varieties in the first group are splendid for cutting.

Perennial Border Species.—A few of the many desirable sorts are briefly described below:—

Lychnis alba.—This is much better known under its synonymous name *L. vespertina*, under which name we describe it.

L. Bungeana.—An attractive bright scarlet sort, flowering in July and August. Height, 12–15 ins.

L chalcedonica (JERUSALEM CROSS).—Probably the most popular sort of all. It can be had in white, scarlet, vermilion, red, etc. The flowering period extends from June to September. The double form (*flore pleno*) is splendid. The height varies from 2½–4 ft.

L. coronaria (CROWNED CAMPION).—This is next in popularity to the above. Its range of colours is similar, though it may also be had in attractive rose-pink and reddish-purple forms. It blooms in July and August, averaging about 3 ft. in height. Its variety *oculata* is considered the best.

L. coronata.—Syn. *L. grandiflora*, which see.

L. Flos-cuculi.—This also is a popular sort with a large range of colour, and it is popularly known as RAGGED ROBIN. It blooms in June, continuing into July, and averages about 1½ ft. in height.

L. Flos-jovis (ROSE CAMPION).—By some this is considered a variety of *Lychnis coronaria.* It seems, however, to be distinct enough to rank as a species. It is a bright, rosy-red June and July blooming subject, about 1½ ft. high.

L. fulgens.—An attractive scarlet sort, flowering from June to October, and averaging 12 ins. high.

---

[1] The PINK LUPINE of some authorities.—EDITOR.

L. grandiflora (Syn. *L. coronata*).—A large, scarlet, free, summer flowering species growing 18 ins. high.

L. haageana.—Another highly attractive scarlet species largely offered by nurserymen, though considered by some synonymous with *L. Bungeana.* It blooms freely in June and July, and its height varies from 1–2 ft.

L. vespertina (Syn. *L. alba*).—This well merits its present popularity, and it can be had in various colours, such as rosy-red, dark crimson, rose, bright pink, and white. It can be had double or single, and blooms freely from early June to late August, and averages rather more than 1½ ft. in height.

L. Viscaria (GERMAN CATCHFLY).—A very useful sort, the colours of which range through pink, red, rose, and white. The flowering period extends from May to August, and the height averages 12 ins. Its varieties *splendens* and *splendens plena* are worthy of special commendation.

Rock Garden Species.—Three species are well worth a place in the rock garden. They are briefly described below, and are propagated by means of seeds sown in spring:—

Lychnis alpina.—A dwarf, tufted plant with narrow leaves. Flowers rose, in dense heads. Site sunny. Soil gritty. It is a biennial, flowering from May to June. Height, 4 ins.

L. Lagascae.—A low-growing plant. Flowers bright rose with white centre. Site, half-shade. Soil gritty. Flowering Period, May to July. Height, 4 ins.

L. pyrenaica.—Similar to the above in character and requirements, but with glaucous leaves, and white flowers which change to rose. The flowers open in May and June. Height, 6 ins.

LYCHNIS LEAF SPOT.—See *DISEASES OF ROCK PLANTS.*

LYCIUM.—For the best species see *CLIMBING AND TRAILING PLANTS.*

LYCOPERSICUM (Nat. Ord. Solanaceæ).—This is a small genus of half-hardy annuals, only two species of which are at all generally grown in gardens. *L. esculentum* is the well-known TOMATO or LOVE APPLE, the culture of which is fully described elsewhere. *L. racemigerum* is the RED CURRANT TOMATO, still somewhat a novelty in this country, but which may be grown in much the same way as tomatoes, and used in a similar manner to red currants.

LYCOPSIS (Nat. Ord. Boraginaceæ).—The BUGLOSS (*L. arvensis*) is the only well-known species of this little genus. It is an unimportant, weedy, hardy annual, bearing blue flowers from June to August, and averaging 1–2 ft. in height. It cannot be said to be of any garden value.

LYCOPUS (GIPSY WORT. Nat. Ord. Labiatæ).—This is a small genus of hardy, moisture-loving herbaceous perennials which have not yet received much attention. They thrive in ordinary good, rich, wet soil, and may be easily propagated by root division in the autumn, at which time they may be successfully planted. *L. europaeus* and *L. exaltatus* are the two best known species. Both bear white flowers in July, and average 3–6 ft. in height.

LYGEUM (Nat. Ord. Gramineæ). This is an unimportant genus of hardy grasses in this country, but abroad, notably in the Southern Peninsula, it is of great importance for basket work and other similar purposes. Of easy culture, it thrives in ordinary light, sandy soil, and is easily propagated in the usual way by root division. The best known species is *L. Spartum*, popularly known as CORD GRASS, which grows about 1½ ft. in height.

LYGODICTYON.—Now included in the genus LYGODIUM, for which see *FERNS AND FERN GARDENING.*

LYGODIUM.—For the best species see *FERNS AND FERN GARDENING.*

LYME GRASS.—See *ELYMUS.*

LYSIMACHIA (LOOSESTRIFE. Nat. Ord. Primulaceæ).—A number of hardy annual, biennial, and half-hardy greenhouse species of this genus have been described, but as they are of very little importance, we exclude them from the present work, and confine our attention to the hardy perennial species, the dwarfer forms of which are useful spreading rock plants, while the taller may be effectively planted in the herbaceous, perennial, or mixed borders, in margins to shrubberies, and in the wild garden. Ordinary light soil, in a sunny or lightly shaded spot, suits them, and they may be propagated by division of the root-stocks in October and March, or by seeds sown in the summer in the usual way. Three species previously included are now described under the genus *STEIRONEMA*, which see; thus *Lysimachia ciliata* is now *Steironema ciliatum; L. hybrida* is *S. heterophyllum;* and *L. longifolia* is *S. longifolium.* We cannot describe all tne remaining species here, but a few of the best ones are:—

Lysmachia clethroides.—This bears pure white flowers from July to August, on plants 2–3 ft. high.

L. Ephemerum (Syn. *L. salicifolia*).—This bears white flowers in August, and averages 1½ ft. in height.

L. nemorum (YELLOW PIMPERNEL).—This may be used in the rock garden, and bears yellow flowers from June to September, on plants rarely more than 6 ins. high.

L. Nummularia.—This is the well-known CREEPING JENNY, with its yellow flowers in June, a dwarf evergreen plant about 3 ins. high, of which many people are so fond. It is a bit too spreading for the rock garden, but useful in the wild garden or for the less select borders. The variety *aurea* has golden leaves.

L. punctata (Syn. *L. verticillata*).—This is a useful yellow border plant, blooming in July, and growing 1½ ft. in height.

L. quadrifolia.—This is a yellow July blooming sort, about 2 ft. high.

L. salicifolia.—Syn. *L. Ephemerum*, which see.

L. thyrsiflora.—This is a yellow June flowering sort, about 1½ ft. high.

L. verticillata.—Syn. *L. punctata*, which see.

[For FALSE LOOSESTRIFE, see notes on *LUDWIGIA.*—EDITOR.]

LYTHRUM (PURPLE LOOSESTRIFE. Nat. Ord. Lythraceæ). — The COMMON PURPLE LOOSESTRIFE (*Lythrum Salicaria*) is a weedy plant of very little value in the garden, but may be used in bog land or at the water's edge. See article on *WATER GARDEN: PLANTS FOR THE.* Its variety *rosea*, however, bearing purple-pink or reddish-pink flowers in July, is more attractive, and may be grown in the herbaceous borders, shrub borders, or wild garden as a hardy perennial. The same remark applies to *L. virgatum*, a purple July blooming sort. Both this and the above grow about 1 yd. in height.

Culture of Lythrums is quite an easy matter. Ordinary soil, plenty of moisture, and a sunny site are the only essentials to success. Propagation by seeds and division of the roots at the usual times is also easy, and the best time to plant is March.

There are besides the above, several annual species in cultivation, but as they are of comparatively small importance we do not describe them here.

[For FALSE LOOSESTRIFE see notes on *LUDWIGIA*.—EDITOR.]

MACARTNEY ROSE (*Rosa bracteata*). See *ROSE SPECIES*.

MACHAERANTHERA.—Now included in the genus *ASTER*.

MACROSIPHUM.—See under ROSE APHIDES, or GREEN AND RED FLY, in *INSECT PESTS*.

MACROTOMIA (Syn. *Arnebia*. Nat. Ord. Boraginaceæ).—The one species described below is a handsome plant most suitable for the rock garden. It is rarely without flowers, and likes a sunny position in well-drained sandy loam. It is propagated by division of the roots in autumn or spring, also by seeds sown in heat in March.

Macrotomia echioides (PROPHET FLOWER).—This has large leaves in tufts. Flowers soft primrose colour, with five dark purple spots. These fade as the flower becomes older. Flowering Period, April to September. Height, 1 ft.

See also *ARNEBIA*.

MADARIA.—Now included in the genus *MADIA*, which see.

MADAROGLOSSA.—Now included in the genus LAYIA.

MADDER.—See *RUBIA*.

MADEIRA ORCHIS (*Orchis foliosa*).—See *HARDY ORCHIDS*.

MADIA (Nat. Ord. Compositæ). This is a small and not very important genus of annuals which may be treated as hardy or half-hardy. The two best known species are *M. elegans* and *M. sativa* (Syns. *M. stellata* and *M. viscosa*). The latter, popularly known as the MADIA OIL PLANT, is available in two varieties, *congesta* (Syn. *M. capitata*) and *racemosa*. All bear yellow flowers from June to August, and average 1½ ft. in height.

MADIA OIL PLANT.—See *MADIA*.

MADONNA LILY.—See *Lilium candidum* in *LILIES*.

MADROÑO (*Arbutus Menziesii*).—See *SHRUBS*.

MADWORT.—A name applied to the genus *ALYSSUM*, which see.

MAGNESIA AND MAGNESIUM COMPOUNDS.—Attention may well be drawn to a few of the compounds of Magnesia even though their use in the garden is somewhat limited. The metal itself finds no horticultural application, but its salts, the Carbonates, Chloride, Hydroxide, and Oxide are used, though to a limited extent, for application to soils which are too hot, and generally may be regarded as having cooling properties. Magnesium Carbonate in its simplest form is at times offered as a rock for wall garden building under the name of MAGNESITE, or as a double carbonate with lime under the name of DOLOMITE, but both these rocks are unsuitable. Magnesium Chloride is found with common salt in KAINIT. Magnesium Oxide is prepared by burning Magnesite, just as Calcium Oxide or Quicklime is obtained by burning limestone. The Hydroxide is not, however, prepared by adding water to the oxide, but by adding a hydroxide of another metal to a solution of some compound of Magnesia. The gardener frequently uses asbestos for lining the hot-water pipes of his greenhouse, and, if he is a smoker, he may use a meerschaum pipe. These are both compounds of Magnesia.

A compound of Magnesia that may have a future before it, if it can be prepared cheaply enough, is Magnesium Nitride, which slowly gives off ammonia in contact with water. It may supersede Calcium Cyanamide (see article on *Lime Compounds*) in this connection on hot, dry soils. It can be prepared by heating Magnesium with Nitrogen or Ammonia, but at present it is little more than a chemical curiosity.

Little is known horticulturally of the uses of Magnesium Nitrate, Phosphate, Pyrophosphate, and Sulphide. The use of these does not appear to have got beyond the experimental stage.

The most important compound from the gardener's point of view is

MAGNESIUM SULPHATE. — This the gardener or his family will probably have taken many times as an aperient under its well-known name of Epsom Salts, but the crude compound is very useful as a manure, especially for roses. Applied at the rate of 1 oz. per sq. yd. in the spring, it proves distinctly advantageous, and it is well to note that the carbonate can be used in the same manner, though at double the rate. Magnesium Sulphate is also used as an ingredient of *Tonk's Manure*, to the article on which our readers are referred.

E. T. E.

MAGNESITE.—See above article.

MAGNESIUM COMPOUNDS. — See *Magnesia and Magnesium Compounds.*

MAGNOLIA.—For the best species see *Climbing and Trailing Plants, Shrubs*, and *Trees.*

MAGPIE MOTH.—See *Insect Pests.*

MAHARANGA.—Now included in the genus *Onosma.*

MAHONIA (*Berberis Aquifolium*).—See *Shrubs.*

MAIDEN PINK (*Dianthus deltoides*). See *Dianthus.*

MAIDENHAIR FERN (*Adiantum Capillus-Veneris*).—See *Ferns and Fern Gardening.*

MAIDENHAIR TREE (*Ginkgo biloba*). See *Trees.*

MAINCROP CELERY.—See *Celery.*

MAIZE, or Indian Sugar Corn (*Zea Mays.* Nat. Ord. Gramineæ). —This vegetable has rapidly come to the fore during recent years, and can be strongly recommended to those who find many of the more popular summer and autumn vegetables not to their liking.

Culture.—Sow the seed in a warm greenhouse during April or early May. Single pots are the best, as from these the plants may, without any check to growth, be put into their summer quarters, choosing a piece of well-manured ground, and keeping well supplied with water. The cobs or fruits are ready for cooking just as the hairy-like substance around them begins to turn brown. Allow from 1–2 ft. apart in the rows.

Varieties.—The best for home cultivation include: Early Sweet Cory, Early Sweet Minnesota, Extra Early Premo, and Kendall's Giant.

F. R. C.

MALCHOMIA or MALCOLMIA.—The same as *Malcomia.*

MALCOMIA.—See *Virginian Stock.*

MALE FERN. — See under Fern (Male) in *Medicinal Herbs.*

MALE FERN (*Nephrodium Filix-mas*). See *Ferns and Fern Gardening.*

MALLOW.—See *Malva* and *Medicinal Herbs.*

MALMAISON CARNATION.— See *Carnation : The Malmaison.*

MALOPE (Nat. Ord. Malvaceæ). This genus is closely allied to *Lavatera* and *Malva* (which see), and one of its members, popularly known as *M. grandiflora*, if treated as a hardy or half-hardy annual, is a capital town plant. It is capable of being grown into a large specimen 2 ft. high, which, when covered with its large, satiny flowers, is most effective. It may be success fully raised by sowing seeds in a greenhouse in early March, or in the open ground in April. In the latter case thinning out the plants to 18 ins. apart is advisable. If raised under glass, the seedlings should be potted singly while quite small, and planted out in May not less than 18 ins. apart, as they have a very bushy habit of growth.

Malope trifida (Syns. *M. ciliata* and *M. grandiflora*).—The type is rarely grown, as the grandiflora strains are finer. There are white, rose, and red-coloured varieties, all of which come fairly true from seeds, and bloom from June to October.—C. H. C.

MALT DUST.

This is not of any great value for the land, but may be dug in at the spring of the year in a fresh state at the rate of 1–3 cwt. per sq. rod, according to whether the soil is poor or rich in humus.

MALVA (MALLOW. Nat. Ord. Malvaceæ).—A number of the Mallows are popular in British gardens, but this can scarcely be said of the annual species. Of these latter probably not more than two are well known, and only one is generally grown. This (*M. crispa*) is more valued as a foliage plant in connection with sub-tropical effects than as a flowering plant, and grows about 5 ft. high.

The Annual Mallows may be raised from seeds sown under glass in gentle heat in March, and at a very early date the seedlings should be potted singly in light rich soil. When the pots are fairly well filled with roots they should be stood in a frame to harden off gradually prior to being planted out at the end of May or early in June. Seedlings of *M. crispa* should be potted a second or even a third time, if necessary, so as to encourage robust growth. They need abundance of water in dry weather.

Perennial Border Species.—These are somewhat numerous and are useful plants for the border, with the exception of *M. sylvestris*, which is more useful in the wild or water garden. All are of easy culture, and no particular remarks are necessary here. They may be raised from seed sown in the usual way in the summer, or they can be propagated by root division in the autumn or spring, at which time they may be successfully planted. We recommend the following species:—

Malva Alcea (Syn. *M. alceoides*).—This, the VERVAIN MALLOW, and its variety *fastigiata* (Syn. *M. Morenii*) bear rose-pink and clear, red flowers respectively from July onwards, and grow 2–4 ft. in height.

M. moschata (MUSK MALLOW).—This is a favourite garden plant bearing pretty pale rose-pink flowers from June onwards, and averaging 1½–2 ft. high. Its variety *alba* is pure white.

M. sylvestris.—This is the true MARSH MALLOW useful in medicine. See under MALLOW in our article on *MEDICINAL HERBS*. As already mentioned, it may be grown in the wild or water garden, where it will bear purple flowers from May to October, on plants 2–4 ft. in height.

[The greenhouse perennial and greenhouse shrub sections of this genus are omitted, as being of little importance. Many of the latter, as well as the hardy species, are now included in the genus *MALVASTRUM*, on which a separate article appears. To describe the stove sections with their culture is beyond our present scope.—EDITOR.]

MALVASTRUM (FALSE MALLOW. Nat. Ord. Malvaceæ).—This genus used to be included in *MALVA*, but is now considered distinct. It contains some useful greenhouse evergreen shrubs and hardy herbaceous perennials.

Greenhouse Species.—These are very free flowering evergreen shrubs, which remain in flower for a long period during the summer months, and require only ordinary greenhouse treatment if potted in a compost of good fibry loam, peat, and silver sand. Cuttings inserted in sandy soil under bell-glass or frame in a little heat prove the best means of propagation. Temperature required, 40–50° F.

Malvastrum asperrimum.—Red. Flowers in July. Height, 3 ft.

M. grossulariæfolium.—Rose. Flowers from July to August. Height, 2 ft.

M. hypomadarum.—Pale rose. Flowers from July to August. Height, 2 ft.

M. tridactylites.—Pink. Flowers from July to August. Height, 3 ft.

Perennial Border Species.—The five species described below are all splendid hardy perennials useful for the borders or rock garden, except the last, which requires the treatment usually given to biennials. They will succeed in good, light, rich soil in a sunny site, and may be propagated in the usual way by seeds sown in the spring or summer and by division of the rootstocks in March, which last is the best period for planting.

Malvastrum coccineum.—This is a scarlet sort, blooming from June to July, and growing about 6 ins. high.

M. Gilliesii.—This is a bright red or scarlet species, blooming from June to August, and growing the same height as the above. It is not hardy in the north.

M. lateritium.—This is a bright vermilion-red sort, blooming from August to September, also 6 ins. high.

M. limense.—This is a pretty pink species, blooming freely from June to September, and growing about 12 ins. high.

M. tricuspidatum.—This is a useful yellow biennial species, blooming onwards from July, and growing 12 ins. high.

MAMESTRA.—See CABBAGE MOTH in *INSECT PESTS.*

MAMILLARIA.—A genus of cactaceous plants. See *CACTI.*

MAMMOTH GOURD.—See *ORNAMENTAL GOURDS.*

MAMMOTH TREE (*Sequoia gigantea*). See *TREES.*

MANAGEMENT OF ALLOTMENTS.—See *ALLOTMENTS: MANAGEMENT OF.*

MANAGEMENT OF CORDONS.—See *CORDON FRUIT TREES.* See also *ROOT PRUNING.*

MANAGEMENT OF GREENHOUSES. See *GREENHOUSE: MANAGEMENT OF.*

MANAGEMENT OF ROCK GARDEN.—See *ROCK GARDEN: MANAGEMENT OF.*

MANAGEMENT OF SEEDLINGS.—See *SEEDLINGS: MANAGEMENT OF.*

MANDRAGORA.—See *MANDRAKE.*

MANDRAKE (*Mandragora.* Nat. Ord. Solanaceæ).—As a medicinal plant Mandrake has now fallen into little use, and in gardens there is little call for its culture unless the collection be very extensive. Botanically it is a hardy herbaceous perennial with long fleshy roots, and is best propagated in the summer by seeds sown in the usual way. *Mandragora autumnalis* and *M. officinarum* (Syn. *M. vernalis*) are the two best species, and the last is the MEDICINAL MANDRAKE proper. The first, as its name implies, flowers in the autumn (September), while the other blooms in April. Both bear light sky-blue flowers, and average 6 ins. in height.

MANDSCHURIAN CRAB (*Pyrus niedzwetzkyana*).—See *TREES.*

MANNA ASH (*Fraxinus Ornus*).—See *TREES.*

MANNA GRASS.—See *GLYCERIA.*

MANSAK (*Hamamelis arborea*).—See *SHRUBS.*

MANURE AND FRUIT TREES.—See *FRUIT CULTURE, HARDY.*

MANURE TOP-DRESSINGS.— See *TOP-DRESSING.*

MANURES.

The purpose of applying manure to the soil is threefold: to improve the tilth, to raise the temperature, and to increase the supply of available plant foods. All manures, including the light, so-called "artificials," effect the last-mentioned object in greater or less degree; only bulky organic substances such as dung have any perceptible effect on the tilth or temperature. The latter are therefore of greater importance to the gardener. For him the tilth is the *sine qua non*, and, for certain purposes, temperature is scarcely less important. For these reasons gardeners do not hesitate to apply four or five times as much manure as farmers would use in similar circumstances.

Farmyard manure or dung (see also separate article) contains all necessary kinds of plant food, but when it is used in considerable quantity it should be supplemented by a fairly liberal allowance of superphosphate or basic slag, in order to correct a tendency to rankness of growth in vegetables, and to improve the yield and quality of fruit and flowers. Given unlimited supplies of dung and phosphates, as a rule nothing else is required, and it is only in special circumstances that artificials can be profitably employed. The supply of good farmyard manure is, however, rapidly diminishing owing to the replacement of horses by mechanical traction, and cow dung from town dairies is often cold and poor. It is probable that in future gardeners will have to depend more and more upon leaf-mould, ferns, peat moss, spent hops, and green manuring to maintain the supply of humus, without which tilth, as gardeners understand that term, cannot be produced; but even when composted (mixed with earth and lime and saturated with liquid manure to promote fermentation) these are mild manures, since they contain but little available plant food, and artificial manures must be added to make good the defect. To be effective the artificials must be adapted to the requirements of the soil, and to the requirements of the crops to which they are applied.

In general, the fertilising ingredients of organic manures, *e.g.* bones, fish and meat meals, guanos, etc., are insoluble, and only become available to plants as the substance decomposes in the soil. Such manures, therefore, act best on the lighter soils, and they are the more suitable because they are less liable to loss by drainage than the more soluble products such as sulphate of ammonia. The latter act more rapidly, and on stiff soils the risk of loss is less. Apart from these considerations a manure may be said to be adapted to the requirements of the soil when it supplies ingredients of which there is a deficiency absolute or relative. Nearly all soils are more or less deficient in phosphates. Sandy soils and peaty soils are commonly deficient in potash, whereas clay soils are usually well supplied with that ingredient. These questions, however, can only be determined by experiment, and it is advisable to try the effect of potash and phosphatic manures together as well as separately, roots, such as swedes, being the most suitable kind of crop for the purpose.

Crop Requirements. — The requirements of crops depend upon (1) the total amount of plant foods they absorb; (2) their assimilative capacity; and (3) the time of year at which they are grown. Plants of the same kind are as a rule much alike in these respects, and may be arranged in groups accordingly. Thus we may say in general that:—

ROOTS, such as beet, carrots, parsnips, radishes, salsafy, and turnips require chiefly phosphates, with a fairly liberal amount of potash and little or no nitrogenous manure.

SEED CROPS, or flowers, fruits, and vegetables of which the seed case or seed is the part required, as is the case in such as beans, cucumbers, marrows, melons, peas, and tomatoes, require liberal amounts of both phosphates and potash, and only small amounts of nitrogenous manures.

STEM AND LEAF CROPS, such as asparagus, cabbages, celery, lettuces, parsley, rhubarb, and spinach, require chiefly nitrogenous manures, with a fairly liberal amount of phosphates, and but little potash.

TUBERS, such as artichokes and potatoes, and LEAF-BULBS, such as leeks, onions, and shallots, require chiefly potash, with a moderate amount of phosphates, and only small amounts of nitrogenous manure.

It is to be noted that the more readily soluble nitrogenous manures tend to produce rather rank growth, and should therefore be used somewhat sparingly for the more delicate plants, especially such as celery and lettuces, which require to be blanched. Quality is generally more profitable than quantity. In fact for nearly all garden crops, except, perhaps, cabbages and spinach, the more slowly acting nitrogenous manures (*q.v.*) are as a rule to be preferred. On the other hand, the more readily soluble kinds if applied to apples, plums, etc., after the fruit is formed and is beginning to swell, often produce splendid results.

Classes of Manures.—Manures may be classified as (1) GENERAL MANURES, *i.e.* those which contain appreciable amounts of all three fertilising ingredients — nitrogen, phosphates, and potash; and (2) SPECIAL MANURES, *i.e.* those which contain only one or at most two fertilising ingredients of which one predominates. The former includes all the bulky organic manures which supply humus and tend to improve tilth; it also includes a few which contain little or no humus. The latter class comprises all, or nearly all, the so-called artificial manures or fertilisers. Both may be divided into sub-groups as follows:—

GENERAL MANURES.

(1) ANIMAL, *e.g.* dung, liquid manure, sewage, etc. See articles on *COW MANURE*, *FEEDING PLANTS*, *HORSE MANURE*, *PIG MANURE*, *SEWAGE AS MANURE*, *SHEEP MANURE*, etc.

(2) VEGETABLE, *e.g.* leaf-mould, peat, seaweed, etc. See articles on *LEAVES*, *PEAT*, *SEAWEED AS MANURE*, *VEGETABLE MATTER*, etc.

(3) MIXED PRODUCTS, *e.g.* manure and loam, manure and seaweed, etc. See articles on *COMPOSTS*, *FARMYARD MANURE*, *SEAWEED AS MANURE*, etc.

SPECIAL MANURES.

(1) PHOSPHATIC, *e.g.* basic slag, superphosphate, etc.

(2) PHOSPHO-NITROGENOUS, *e.g.* bones, fish meals, etc.

(3) NITROGENOUS, *e.g.* meat meal, nitrate of soda, sulphate of ammonia, etc.

(4) POTASH, *e.g.* kainit, sulphate of potash, wood ashes, etc.

(5) COMPOUND FERTILISERS, of which there are now many makes.

(6) GUANOS of every kind.

(7) MISCELLANEOUS MANURIAL SUBSTANCES, *e.g.* copperas, gypsum, etc.

NOTES ON SPECIAL MANURES.

The following notes on the various kinds of special manures are arranged under the above heads. See also articles on *AMMONIA AND AMMONIUM COMPOUNDS; IRON AND IRON COMPOUNDS; MAGNESIA AND MAGNESIUM COMPOUNDS; LIME COMPOUNDS; POTASH AND POTASSIUM COMPOUNDS; SODA AND SODIUM COMPOUNDS*, etc.

(I) **Phosphatic Manures.** — The following are the most important:—

BASIC SLAG.—This is a by-product in the manufacture of steel: average qualities contain from 25–35% of total phosphates, the normal price being £2–3 per ton, according to quality. The phosphates in basic slag are insoluble in water, but, being basic in character, become available for plants more readily than those of the Raw Phosphates mentioned below. From 20% to 90% of the total phosphates of basic slag may be soluble in a 2% solution of citric acid (Wagner's method), but recent experiments tend to show that samples which have a high "citric solubility" are not necessarily superior, as was formerly believed to be the case. The manurial efficiency of basic slag appears to depend to a much larger extent upon the fineness of grinding, and, next to the percentage of phosphates, that is the most important consideration. The guarantee commonly given is that at least 80% of the powder will pass through a sieve having 100 wires to the inch, *i.e.* 10,000 holes to the square inch; less finely ground samples should not be purchased even if offered at lower prices. It is often asserted that basic slag contains free lime, but the amount of that ingredient in samples produced by more modern methods is usually insignificant; the presence of even small amounts, however, serves to emphasise the basic character of this manure as opposed to the acid character of superphosphate, and on this account it is preferable for root crops and leguminous plants when the soils are deficient in lime. Basic slag does not act well on dry soils; for this reason, and also because it tends to flocculate clay and so to improve tilth, it generally shows to greater advantage on stiff soils. It should be applied at the rate of 4–8 oz. per sq. yd.

BASIC SUPERPHOSPHATE.—This, made by mixing ordinary superphosphate with lime, has been recommended for light soils deficient in lime, but better results would probably be obtained by first dressing the soil with ground chalk and then applying ordinary superphosphate. If used, however, it should be applied at the rate of 2–3 oz. per sq. yd.

RAW PHOSPHATES. — These include mineral phosphates (apatites and phosphorites), phosphatic guanos, coprolites, etc., which have not been chemically treated. If very finely ground they are not without effect, but act slowly and are not profitable. They are rarely offered in retail.

SUPERPHOSPHATE.—This is made by heating raw phosphates or bones with sulphuric acid (oil of vitriol); average qualities containing 25–35% of phosphates soluble in water; the normal price of which is £2, 10s. to £3, 10s. per ton according to quality. It is one of the best garden manures, suitable for nearly all crops, but, being acid, should not be used on soils deficient in lime. If stored in damp places the phosphate is liable to revert to the insoluble state, and the efficiency of the manure is reduced. Apply 2–3 oz. per sq. yd. in the spring before sowing, or 1 oz. per gallon of water in the summer.

(II) **Phospho-Nitrogenous Manures.**—The most important are:—

BONES.—After extraction of the fat, the bones are crushed and sifted; the portion which passes through sieves having two wires to the inch is called "half-inch bones," and that which passes through sieves having four wires to the inch is called "quarter-inch bones." These act very slowly and are unsuitable for ordinary purposes. Of the finer portion, known usually as bonemeal, or as bone-dust and bone-flour, at least 90% should pass through a sieve having eight wires to the inch, and if it be more finely ground so much the better. A more or less considerable portion of the nitrogenous matter (gelatine) is sometimes removed by steaming and the residue is known as steamed bone-flour: this product necessarily contains a higher percentage of phosphates than unsteamed bonemeal, but owing to the removal of nitrogen it is of different manurial value and is cheaper. Finely ground bonemeal and steamed bone-flour are very suitable for all the more delicate garden crops, but are rather slow for the stronger vegetables. To use, apply about 2 oz. per sq. yd. at the back end of the year or early spring, and lightly fork in. See also separate article on *BONES*.

DISSOLVED OR VITRIOLATED BONES.—These are made by treating half- or quarter-inch bones with sulphuric acid. The material is sometimes called "bone superphosphate," but the term is ambiguous and misleading. By the action of the acid some of the phosphate is rendered soluble in water, and the nitrogenous matter is also altered and becomes more readily available to plants. Average samples contain 10–15% of soluble phosphates, as well as 15–20% of insoluble phosphates and 2–3% of nitrogen, the normal price being about £7–8 per ton. It forms an excellent manure safe and suitable for nearly all garden crops, but, being acid, should not be applied to soil deficient in lime. It acts more rapidly than bonemeal, but is more expensive in proportion to the amount of fertilising ingredients it contains, and is best used at the rate of 1–2 oz. per sq. yd. in the spring. For methods of dissolving bones see DISSOLVED BONES in article on *BONES*.

FISH AND MEAT MEALS.—These products are often described as "guanos," but they are not excrements: the former is made from dried fish offal from the curing stations; the latter is made of slaughter-house refuse, condemned carcasses, and to some extent also from the residues obtained in the manufacture of meat extracts. Both fish and meat meals contain high percentage of nitrogen, and some samples also contain considerable amounts of phosphates. The percentage of the latter ingredient depends mainly upon the amount of bone included. In some samples bone is almost entirely lacking, and these should not be classed as phospho-nitrogenous but as purely nitrogenous manures. The fertilising ingredients are insoluble, but become available to plants as the substance decomposes: on light soils this occurs fairly rapidly, and the manures are perhaps more suitable for fairly hardy vegetables. For ordinary garden purposes apply about 1 oz. per sq. yd. in early spring and lightly fork in, but if used for flowers or fruit about half that quantity will be enough.

(III) **Nitrogenous Manures.** — These form a very large class. Some of the most important are described below :—

NITRATE OF LIME.—This is manufactured from the nitrogen of the air by a recently discovered process, and averages about 75% pure, or, in other words, contains 13% of nitrogen. The remainder consists mainly of lime, and for this reason it is sometimes recommended in preference to nitrate of soda, which in some respects it closely resembles, but it is more expensive in proportion to the nitrogen it contains. The normal price is £9–10 per ton, but large quantities should never be bought as it attracts moisture strongly, and thus becomes spoilt. For use apply ½–1 oz. per sq. yd.

NITRATE OF POTASH.—This is commonly known as SALTPETRE, and the pure salt contains 14% of nitrogen, with 46·5% of potash. It is very similar to nitrate of soda and is sometimes recommended for garden use, but is not economical. Apply 1 oz. per sq. yd.

NITRATE OF SODA.—This is a natural product imported from Chile, average samples being 95% pure. The material contains 15·6% of nitrogen, and its normal price is £10–12 per ton. It is extremely soluble in water and too rapid in action for most garden crops except strong green vegetables, such as cabbages. It should not be allowed to come in contact with leaves as it is liable to burn them. The notion that this manure exhausts the soil may be dismissed, so long as lime has been applied first. For use scatter 1 oz. per sq. yd. and hoe or water in.

NITROLIM.—This is manufactured from nitrogen of the air, and contains about 60% of calcium cyanamide, or 20·6% of nitrogen, *i.e.* about the same as sulphate of ammonia; it also contains about 25% of quicklime and 15% of other harmless impurities. It is known also as CYANAMIDE, and is suitable for the same crops as sulphate of ammonia, but is much better on soils deficient in lime. Apply ½–1 oz. per sq. yd. in the spring about a fortnight before seed sowing.

ORGANIC PRODUCTS.—This group includes various kinds of scrap and refuse material of animal origin. In general character they all resemble those fish and meat meals which contain no phosphates but are purely nitrogenous manures. The nitrogen is insoluble and only becomes available as the substances decompose in the soil, and the materials vary considerably in composition as well as in rate of action. Most of them are difficult to obtain in retail quantities.

DRIED BLOOD.—This is perhaps one of the most important members of the group, but is more rapid in its action than any of the others, and is a suitable nitrogenous manure for the majority of garden crops. Average samples contain 12–14% of nitrogen, the normal price of the material being £8–9 per ton. For use apply ½–¾ oz. per sq. yd. in the spring, and lightly fork in.

HOOF PARINGS, horn shavings, ivory dust, and leather dust may yield as much as 16% of nitrogen, but samples sold as manure usually contain less—only about half that amount very often. In the untreated condition their action is extremely slow and their purchase is not recommended.

WASTE HAIR, feathers, shoddy, and woollen rags are similar in composition and properties to hoof parings, etc., but they are not quite so slow in action and are used to some extent as garden manures, chiefly for flower-beds, fruits, and roots. They may be made into a compost by mixing with earth and lime, and the heaps saturated with liquid manure to promote fermentation.

SULPHATE OF AMMONIA.—This is a by-product from gas works, and average samples are 95% pure, these containing 24·5% of ammonia or 20% of nitrogen, the normal price being £13–16 per ton. It is readily soluble in water and acts rapidly, but is safe enough for hardy vegetables, for backward crops and for late applications in quantities not exceeding ½–1 oz. per sq. yd; it should not be applied before the seed, but only to growing crops. To secure the best results the total quantity should be mixed with two or three times its weight of sand or gypsum and the mixture divided into three equal portions, to be applied at an interval of a week or ten days. For delicate plants, *e.g.* flowers, this precaution should always be observed. The manure is not acid, but may give bad results on soil deficient in lime.

(IV) **Potash Manures.**—These form a very important class. The chief are briefly described below:—,

ASHES.—The ash of all plants *e.g.* weeds, straw, wood, etc., contains 10–35% potash, which is present chiefly in the form of the carbonate. As this is an alkaline salt, it has an injurious action on seeds and roots, and tends to spoil the the tilth of clay soils. Thus ashes should not be too freely used. The amount produced in the ordinary course of garden operations is, however, too small to do any harm, and larger quantities are not as a rule obtainable. The common belief that coal ashes are injurious is mistaken; cinders, of course, are objectionable, but coal ashes finely ground and sifted through a one-eighth inch sieve are nearly as good as wood ashes. Twigs, hedge trimmings, prunings from fruit trees, and other similar material contain more potash than older timber, while grass and weeds are also rich in that ingredient. It is sometimes recommended that these should not be burned but allowed to rot so as to avoid losing the nitrogen they contain, but this loss is a small matter compared with the importance of destroying running roots and the seeds of noxious weeds. See also articles on *Ashes* and *Burning Garden Rubbish.*

FLUE DUST.—This is obtained from iron furnaces, and contains from 3–12% of potash, and costs £2–5 per ton; it is insoluble and cannot be expected to produce such good effects as the German salts mentioned below, but is now being tried as a substitute while these are unobtainable, and in some cases has been very successful. For use apply 3–4 lb. per sq. rod.

KAINIT.—This is obtained from natural deposits at Stassfurt in Germany; it may be regarded as a mixture of sulphate of potash with common salt and some magnesium compounds; the last are of no value, and common salt is positively injurious to most garden crops, including potatoes. Kainit usually contains 10–12% of potash, and four or five times as much must therefore be used to produce the same effect as 1 lb. of sulphate or muriate of potash. The normal price is about £2 per ton, but for equal amounts of potash it is no cheaper than the others. Kainit cannot therefore be recommended except perhaps for asparagus and such other plants as are known to withstand or benefit by the effects of large amounts of common salt. For use apply it at the rate of 2–4 oz. per sq. yd. in the autumn or winter.

MURIATE OF POTASH.—This also is obtained from Germany, average samples being about 80% pure, and thus contain 50·5% of potash. In other respects it is practically the same as sulphate of potash and may be used in the same way, but the latter is perhaps to be preferred.

SULPHATE OF POTASH.—This is also obtained from Germany, average samples being about 90% pure, and thus contain 48·6% of potash, the normal price being £8–9 per ton. The potash is soluble in water, but is retained by the soil and not therefore liable to loss. This is the best potash manure for flowers, fruits, potatoes, and most other garden crops, and for equal amounts of potash it is not more expensive than any other. For use apply about 1 oz. per sq. yd. in the spring before sowing seeds.

(V) **Compound Fertilisers.** — Products prepared from scrap and refuse material chemically treated to render the manurial ingredients more readily available to plants and sometimes mixed with simple fertilisers are classed as compound fertilisers or manures. Most of them contain phosphates and nitrogen, some also containing potash. In many cases the ingredients are blended in the proportions supposed to be suitable for particular crops, and these are generally described as "potato manures," "vine manures," "fruit and flower manures," and so on. In other cases the manures are represented as being more or less suitable for all crops, and these are usually described by some personal or purely fancy name, *e.g.* "Smith and Jones' manure," etc. Some of these so-called compound fertilisers or manures are quite worthless, but this form of fraud is fortunately not so common now as formerly, and those sold by reputable firms usually contain the amounts of fertilising ingredients advertised and guaranteed. In view of the comparatively small amounts of fertilisers commonly used by gardeners such mixed or compound manures have much to recommend them for horticultural purposes, and the objection to applying nitrogen at the same time as the phosphates and potash loses much of its force if the nitrogenous matter is of a slow-acting character, as it should be in garden manures. It cannot be said, however, that compound fertilisers or manures are economical; equal quantities of nitrogen, phosphates, and potash can always be obtained at less cost in the form of simple fertilisers; allowing for the cost of treatment, mixing, and the fact that they are sold to gardeners in relatively small quantities, the prices charged for some compound manures are undeniably excessive.

Dissolved bone compounds, for example, should not be charged for at the same rate as vitriolated bones, even if they contain the same percentages of fertilising ingredients, because such compounds may consist mainly of a mixture of superphosphate, sulphate of ammonia, and scrap materials that can be obtained at much lower prices than bones. The name is deceptive, and unless such a compound is offered at a much lower price, gardeners would be well advised to purchase pure dissolved bones (*q.v.*) or to choose some other manure.

MIXING MANURES.—It is a mistake to imagine that mixed or compound fertilisers or manures can be made without a good knowledge of chemistry. Almost all kinds of manure may be applied to the same piece of soil; but they should not be first mixed together, as some of them react, mutually destroying their peculiar properties or causing loss of fertilising ingredients, and in certain cases damage to persons and property as well. Mixing never does any good: it often does much harm. In any case different kinds of manure should not as a rule be applied at the same time of year. For particular fertilisers not to mix see our article on *Artificial Fertilisers*.

(VI) **Guanos.**—See separate article.

(VII) **Miscellaneous Manurial Substances.**—Common salt, copperas, and gypsum are used by some gardeners, but they contain no fertilising ingredients and are not, strictly, manures at all. Gypsum is merely a make-weight, and, in quantity, the other two may be more or less injurious to most garden crops.

Valuation of Manures. — The "normal prices" quoted in this article are intended merely to convey some idea of the relative cost of the different substances: they are, roughly, those prevailing prior to 1914. There is no necessary connection between the prices and productive efficiency. The latter depends mainly upon the percentages of fertilising ingredients present: the former fluctuate from day to day from independent causes. For purposes of valuation, however, it is assumed that, while conditions—as regards supply and demand—remain the same, the price is, or should be, proportional to the percentages of fertilising ingredients. For example, if superphosphate containing 25% of soluble phosphates can be purchased at £2, 10s. per ton, the price of superphosphate of any other grade may be found by "rule of three" as follows:

25% super. costs		.	50s. per ton.
1% ,,	,,	.	$\frac{50}{25}$=2s. per ton.
35% ,,	,,		2s. × 35 = 70s. per ton.

The price per ton divided by the percentage of fertilising ingredient is called the unit value of that ingredient. Prior to 1914 these were approximately as follows:

	Per unit.	
	s.	d.
Insoluble phosphate (in basic slag)	1	3
Soluble phosphate (in superphosphate)	2	0
Potash (in sulphate or muriate of potash)	3	6
Nitrogen (in sulphate of ammonia)	12s. to 14s.	

The unit value of any ingredient is not necessarily, or usually, the same in different kinds of manure, but the ratios of the unit values of the several ingredients is nearly the same in all; and it is by preserving these ratios that the unit values of the several constituents in manures that contain more than one can be determined in accordance with the current prices. In bones the unit value of nitrogen is higher than in sulphate of ammonia, and the unit value of the phosphates is higher than in basic slag. This does not mean that bones are better manure, but only that they are more expensive.

The unit values of the fertilising ingredients in various manures are published periodically in the technical press, and may be used to calculate the price per ton. The rule is: "Multiply the price per unit of each constituent by the percentage present," and the sum of the products gives the price per ton. Take as an example a mixed manure and let the data be as follows:

Fertilising Ingredient.	Value per unit.			Percentage present.		Value per ton.	
	s.	d.				s.	d.
Nitrogen . .	15	0	×	7·2	=	108	0
Soluble phosphate . .	2	1	×	16·5	=	34	4
Insoluble phosphate .	1	4	×	12·4	=	16	6
Potash . .	3	8	×	6·8	=	24	11
Total . . .						183	9

Price per ton = $\frac{183\frac{3}{4}}{20}$ = £9, 3s. 9d. per ton.

The price of any manure, *e.g.* superphosphate, may be different at London, Hull, Bristol, etc., and, in any case, the cost of carriage must, in general, be added to the prices calculated from published unit values. Quantities of less than one ton are always charged at higher rates; in fact, gardeners who buy by the hundredweight are frequently charged double the price asked of farmers who purchase by the ton.—J. A. M.

MANURES AS SOIL IMPROVERS.—See *SOIL IMPROVEMENT.*

MANURES AND SOILS: Weight of Bushels of. — See FERTILISERS, MANURES, AND SOILS in *WEIGHTS AND MEASURES.*

MANURING: Principles of.

The raw material which a plant builds up into food is drawn from two sources, namely, the air and the soil, and it is in connection with the latter source of supply that the question of manuring arises. Experiment has shown that the food which a plant requires can only satisfactorily be obtained if a certain number of substances are available in the soil-water. It is not essential to consider in detail each of these necessary substances, for in an ordinary soil it is probable that most of them will be present in sufficient quantity to grow an average crop. At a later stage in this article, detailed consideration will be given to those substances which are most generally found to be present in such small quantities as to limit the proper growth and development of the plant.

When the productive power of a soil diminishes, as it is often seen to do when heavily cropped, the cultivator must take steps to provide those substances which, through their absence or shortage, are preventing the plant from developing in a normal fashion. Even poor soils contain relatively large stores of material from which the plant may build up food, but these stores may be in an unavailable form. By cultivation and proper treatment this unavailable material may be converted into available substances which the plant can utilise. It is well that there should be this difference, for if all the crude plant-food were available at any one time, there would be danger of the surplus which the plant could not use being washed out of the soil and so lost.

The changes by which food material is gradually made available are complicated, and depend upon a number of factors, amongst which water (rain), air, heat, and the activity of micro-organisms are the chief.

When the substances which the plant requires are available they will dissolve in soil-water, and the weak solution so obtained is taken up by the root-hairs. This dissolved material is distributed throughout the plant, and as at the same time the leaves are probably engaged in manufacturing sugar and starch, the production of food for man and beast proceeds.

It was thought at one period that by analysing the soil, and ascertaining the quantity of food material in it, there would be little difficulty in providing the plant with what it needed. If the soil failed to contain the requisite quantities of the various foods, the cultivator only required to add that which was lacking in order to obtain a crop of maximum size. The results obtained, however, by working on these lines were in many cases disappointing, and this led to a close scrutiny of the whole question of crop growth.

An explanation of the failure was in some cases afforded by the difference (already mentioned) between available plant-food, and that which, although present in the soil, was not in an available form. There still remain, however, a considerable number of difficulties to be overcome before the principles of manuring and plant-growth can be stated with certainty.

The subsoil cannot be left out of consideration, for the decay which is going on there continually provides the soil with material which can be utilised by the plant.

Although it is true that only slight reliance can be placed upon the information afforded by the analysis of individual samples of soil, there is, nevertheless, great assistance to be gained from the analysis of a considerable number of soils and subsoils. These analyses must, of course, be considered in conjunction with the details of crops grown upon the soils, and such other information as can be procured.

To the gardener dealing with a relatively small area of land, which has perhaps been heavily manured and cropped, the analysis of the soil can only be used to indicate broadly the treatment and cropping which are likely to give greatest returns. The main thing to recognise is that the available plant-food is rapidly exhausted in the average soil, and consequently that appropriate steps must be taken to make good these losses.

It is along two lines that the soil may be improved: (*a*) by accelerating the change of an unavailable plant-food into an available form, and (*b*) by the direct addition of some suitable manure.

In this connection there is one point which should be brought forward prominently, and that is the necessity of organic matter. The difference which is seen in the texture and colour of a well-cultivated garden as compared with the same soil growing farm crops, is largely to be explained by the greater amount of rotted organic material — or humus as it is generally termed— which the former contains. This humus plays a very important part in the growth of crops; not that it is itself a plant-food, but because it provides by its further decay the nitrogen compounds which the plant requires. Also, and this is most important, the humus improves the texture of the soil, making it more suitable for plant-growth, and producing a good tilth which is so essential in the preparation of a suitable seed-bed.

Humus as a soil improver acts in two main directions: first, it gives to the soil a much increased power to retain water, and further, by its decay it acts upon the store of plant-food which is not in an available form and renders the latter soluble and available; secondly, humus darkens the colour of the soil, and this condition is of advantage to the plant, seeing that the darker soils warm up more rapidly than do those of a lighter colour.

Soils, particularly those of the sandy character, fail in productive power largely on account of the decrease of humus. Such soils are often spoken of as hungry soils, and the best way to improve them lies in supplying them with an adequate quantity of organic matter, which by its decay shall replace the humus which has been lost.

Enough now has been said to indicate the main lines upon which the manuring of plants is based, and it now remains to consider more in detail the various groups of manures and their main characteristics. It is not proposed to deal with each individual manure, but to show the broad differences which exist between the various groups.

The Two Classes.—Manures are conveniently divided into organic and inorganic, and these divisions correspond more or less closely with what are termed natural and artificial manures.

From what has been said in the foregoing, it will be understood that organic manures contain organic matter (either from plant or animal remains), and they yield the important material known as humus. In addition to the humus there is also nitrogenous material which undergoes a change (largely through the action of the soil bacteria), and ultimately yields the nitrates which are the chief source of supply of the nitrogen which the plant requires.

Such organic manures as dung, dried blood, rape dust, feathers, wool waste, etc., are used largely for the nitrogen which they contain, and which provides the nitrates so essential to plant-growth. Other manures of an inorganic nature, such as nitrate of soda, and sulphate of ammonia, also yield nitrates and in large quantities.

The ultimate effect of nitrogen is to promote the growth of leaf in the plant. Where a plant is not supplied with a sufficient amount of nitrogen, its leaf and stem plainly show by their poor development and pale colour that something is lacking. In such cases the use of a manure which contains nitrogen will excercise a very noticeable effect, and luxuriant deep green leaf growth will soon evidence itself. This rapid growth is particularly shown when a manure which is soluble and rich in nitrogen is applied.

Caution must always be exercised in the application of manures rich in nitrogen, for it is possible to overfeed the plant, and to get a rank leaf growth and not a well-balanced development. Also in this connection it must be borne in mind that excess of nitrogenous manure, once it has been converted into nitrates, is easily washed from the soil and lost. Slow acting organic manures which have to undergo decomposition in the soil, and yield up their nitrogen gradually, are less liable to undergo this loss by washing out.

It may be mentioned also in this connection that plants which have been overfed with nitrogenous manures are more liable to be attacked by fungus diseases. The use, therefore, of quick acting nitrogenous manures, such as nitrate of soda or sulphate of ammonia, must be carefully carried out, and it is preferable to give such manures in two or even three doses rather than all at once.

Slow acting manures, such as dung, or other organic material containing nitrogen, can usually be given only at one time, and as the changes which have to be undergone by the material before it is soluble and ready for the plant take some time, there is little risk of any serious loss by washing out, provided always there are plants ready to take up the finished product.

It frequently happens that the growth of a crop is limited by the amount of phosphates which are present in the soil, and in consequence of this effect the use of phosphatic manures has become general. The effect of phosphates (or phosphoric acid as it is sometimes termed) is to keep the plant balanced, and to make it develop and ripen normally. This unbalanced growth is particularly noticeable in soils which are richly supplied with nitrogen, either naturally or by manuring. In such soils the plants tend to grow rankly, and not to produce seed or fruit in proper course. This effect of phosphates is also seen in wet seasons, when crops which are supplied with phosphate are usually found to ripen more satisfactorily and at an earlier date than those crops which are insufficiently supplied. Further, the presence of phosphates assists the plant in the formation of root, and, as will be easily understood, good root development is essential if plants are to make maximum growth. Good roots also enable the plant to withstand drought.

Amongst organic phosphate manures there are various forms of bones, for example, bonemeal, steamed bone-flour, dissolved bones, etc. Guano and fish-manure also supply convenient quantities of phosphoric acid, whilst superphosphate and basic slag are the chief representatives amongst the inorganic manures.

In superphosphate and dissolved bones some of the phosphate is present in a water soluble form, and although this soluble phosphate changes into the insoluble state when it meets with lime in the soil, nevertheless, this latter form of phosphate is more readily available to the plant than the original phosphate. There is the advantage also that water soluble phosphate is distributed more widely in the soil than if it were in the solid form.

Basic slag is very finely ground in order that the insoluble-in-water phosphate which it contains may be distributed as much as possible, and be acted upon by the soil moisture and rendered soluble, and available for the plant.

It remains now only to mention the third material, viz. potash, which by its shortage may limit plant-growth. In soils of a sandy nature the quantity of potash is usually limited, and on such soils potash manures are practically certain to yield good results. The effect of the potash is perhaps not quite clear, but undoubtedly it influences the production of carbohydrate, *i.e.* sugars and starches. In consequence of this action plants provided with adequate supplies of potash yield bigger crops than those which are insufficiently supplied. The grain in a cereal crop, the weight of roots or potatoes lifted, and the quantity and quality of fruit, are all superior when potash is available.

Potash is supplied in farmyard manure, in wood ashes, and in the special potash manures such as sulphate or muriate of potash, and Kainit. Latterly it has been found that the dust from blast furnace flues contains considerable quantities of potash in some cases.

Details of how to apply these various manures will be found in the article on *MANURES*, and also in the articles on *SODA AND SODIUM COMPOUNDS*, *POTASH AND POTASSIUM COMPOUNDS*, which we hope will be carefully studied.

If a gardener or allotment-holder takes the trouble to understand the principles which underlie manuring, and if he then makes himself acquainted with the characteristics and properties of the several manures, he will be in a position to grow his crops more successfully, and with less cost, than if he relied upon some special manure which has been advertised as the very best for a particular crop or crops.

In conclusion, the article on *LIME* should be very carefully studied. Space does not allow of any mention of this material, but its importance cannot be over-estimated.

W. GDN.

MANZANITA (*Arctostaphylos tomentosa*).—See *SHRUBS*.

MAPLE.—A name applied to the genus ACER. See *TREES*.

MAPLE LEAF BLOTCH.—See under SYCAMORE LEAF BLOTCH in *DISEASES OF PLANTS*.

MAPLE-LEAVED GOOSEFOOT (*Chenopodium hybridum*). — See *CHENOPODIUM*.

MARCH MOTH.—See under WINTER MOTHS in *INSECT PESTS*.

MARE'S TAIL (*Hippuris vulgaris.* Nat. Ord. Halorageaceæ).—This is a useful perennial plant for the rougher portions of the water garden, growing about 1 ft. high. Once planted in a soft, wet spot it will look after itself.

MARGARET CARNATIONS. These are hybrids between the Garden Pink and some of the Carnations. If sown early in heat and planted out they often bloom the same year. Planted in a frame they give flowers during the first winter after sowing, and are very useful for cutting, as well as free flowering.—S. A.

MARGUERITE FLY.—See *INSECT PESTS.*

MARIGOLD (*Calendula* and *Tagetes.* Nat. Ord. Compositæ).—Although many species of Calendula and Tagetes are recorded, very few of them are important as garden plants. Among the former that are hardy annuals, only two are in cultivation, namely, *Calendula arvensis*, the FIELD MARIGOLD, and *C. officinalis*, the ever popular common or POT MARIGOLD, which last has been in cultivation about 340 years.

Calendula arvensis produces yellow flower-heads throughout the summer, and is about 2 ft. high.

C. officinalis blooms from early June to late autumn in warm seasons, and grows about 18 ins. high, but may reach a height of 3 ft., when it has ample room and rich soil. The flower-heads of modern varieties are 3–4 ins. across and range in colour from pale lemon to deep orange. Some of the best varieties are: *Favourite* (pale sulphur, with creamy-white stripes); *Lemon Queen* (pale lemon-yellow, very double and a great favourite); *Meteor* (handsome yellow flowers, striped with lemon-yellow); *Orange King* (a splendid variety both in form, size and colour—deep orange, very double); *Prince of Orange* (rich orange with lemon-yellow stripes); and *Sulphur Queen* (light sulphur-yellow).

All the foregoing are double varieties with blooms 2–4 ins. across, but in light hot soils the flowers do not come so double as when produced from plants amply provided with food and moisture. Where these handsome old-fashioned flowers are loved, there should be two sowings: one in spring (March or April), and one in autumn (about mid-August). In the shrubbery border or odd corners, where they are especially serviceable, self-sown seedlings appear abundantly, and these need only be thinned to a foot or so apart, with an occasional hoeing among them while young, to produce a fine effect, but the flowers do not maintain the colouring and character seen in named varieties carefully selected raised year by year.

African Marigold.—The strong-growing, yellow-flowered African Marigold is a totally different plant to those referred to above. It belongs to the same Natural Order, but is a member of the genus Tagetes (*T. erecta*), and a native of Mexico. In its modern and improved varieties it is an excellent subject for garden decoration in summer and autumn, but it is tender, therefore seedlings should be raised in early spring in gentle heat and planted out at the end of May or early June, 1½–2 ft. apart, in a sunny position. Well-grown plants will grow 1½–2½ ft. high, and carry flower-heads several inches across, appearing most effective. The colour ranges from pale yellow to orange, and two of the best varieties are *Giant Orange*, double; and *Orange Beauty*, single. Most seedsmen offer good strains under colour only.

French Marigold. — The dwarf and very free flowering French Marigolds have been raised from *Tagetes patula*, a plant introduced to British gardens from Mexico a very long while ago. They should be treated like African Marigolds, except that they should be planted 9–12 ins. apart, and used for grouping or for marginal edgings to beds and borders. The tall, single-flowered French forms are scarcely so generally useful as the handsome dwarf varieties *Cloth of Gold* (rich yellow); *Diadem* (chestnut and red and yellow); *Legion of Honour* (yellow and brown, very popular); *Queen of Dwarfs* (double, brown and yellow); *Silver King* (pale yellow and maroon); and *Star of India* (crimson, striped yellow), which average 6–9 ins. high. Yellow, lemon, and blotched double forms are also offered by seedsmen under their colour.

Tagetes lucida and *T. signata*, with yellow flowers, have some merit, especially the *pumila* form of the latter species.—C. H. C.

See also *MEDICINAL HERBS*.

MARIPOSA LILIES, or STAR TULIPS (*Calochortus*. Nat. Ord. Liliaceæ).—This is an extremely lovely tribe of plants which for the most part come from California and other parts of North America. As they are very difficult to manage with any degree of success, no one is advised to attempt to grow them unless they have considerable horticultural experience and can give a good deal of attention to them. The great difficulties which have to be overcome are the cold rain and damp of winter and the proper ripening of the bulbs. Frame culture is almost essential, but in favoured positions they may be grown at the foot of a south wall in light soil.

The varieties of *C. venustus* are the most popular ones in the genus, and a colour range of yellow, lilac, rosy-purple, pure purple, pure red as well as pure white is available. They flower mostly in August, and average 1½ ft. in height.

J. J. & E. T. E.

MARJORAM (*Origanum Marjorana*). See *ORIGANUM* and *POTHERBS*.

MARKET GARDENING.

In this article the term "market gardening" is used in the older sense of the man who cultivates large quantities of fruits and vegetables for sale in the open market, and who has little glass at his disposal beyond a few lights or frames. The market "grower" is quite a different individual, although he also grows for market. His business is of such a nature as to necessitate large areas of glass structures to enable him to bring to perfection cucumbers, grapes, tomatoes, also foliage, and flowering plants in which he specialises.

Site for a Market Garden.—The man who wishes to succeed as a market gardener must be careful to select a site suitable for the purpose. He should avoid bleak, cold, and very hilly spots on the one hand, and very low, marshy, or swampy places on the other. He should seek to establish his holding at an elevation from 50 to not more than 300 ft. above sea-level, wherever the soil is of a good depth and of a loamy or silty nature. Heavy cold clayey soils should be avoided, as the cost of preparation will not only be great, but the crops on such a soil will always be much later than in more congenial localities. Before actually committing one's self to a certain site, it is always advisable to sample the soil in different places by digging a hole about 2–3 ft. deep, to see what the upper crust is like, and also the subsoil. If rock of any kind is too near the surface, a site of this kind is best left alone. If fine sand or gravel comes some 2–3 ft. beneath a good loamy top soil, such a position may be considered suitable for market gardening. A chemical analysis may be helpful in deciding, but it does not follow that a correct deduction from a market gardening point of view may result. A man who is a practical fruit or vegetable grower is far more likely to give an accurate judgment on the value of a soil than the chemist, as many theoretical fruit growers have found out.

Situation.—In addition to a good site the question of locality is of some importance. The finest site in the world would be useless if it was too far from the market, from a railway, or if there were no workmen living within a reasonable distance. There are still many splendid market garden sites in the kingdom, but until other facilities develop, they must remain in embryo. It is obviously a wise proceeding to begin market gardening within a few miles of a large town or city, as it will not only be easier to market the produce, but also to secure supplies of manure and the necessary labour.

The Size of a Market Garden.—This depends upon the size of the market gardener's pocket. Still, there must be a minimum below which it would be unsafe to go, and this minimum should be about four or five acres. Of course, there are many men who make a living from a piece of land half this size, but as a rule they become more florists than market gardeners in a very short time, and they have to work hard and long to get the utmost out of their little holding. On the whole, a market garden of about 10 acres is quite small enough for a start. With luck and good management, combined with cultural skill, the area may be extended according to circumstances.

Obtaining the Site.—There are three ways in which a market gardener may commence business. First, he may prefer to rent a garden that is already established as a going concern. He will then probably pay an agreed price for the stock, and also an extra sum as "ingoing," and take over the usual liabilities of paying the rent, rates, and taxes, and keeping the holding in proper repair for the landlord. He should see that he does not sign any agreement with his eyes shut, as he will sooner or later find out that there are many little points in such that he will consider to be unfair to him, or they will at least cause him constant irritation.

Secondly, a man may rent a piece of land on the understanding that he is to make a market garden of it. Here again he must be careful to see that he gets what he wants, as ultimately all he possesses may go to the landlord. In this case a long lease, or one that may be renewed at a fair rental after a certain number of years, would be the most sensible way to go to work, taking care that he secures all the benefits of the Market Gardeners' Compensation Act.

Thirdly, perhaps the best method of securing a market garden would be to purchase the freehold of the land on reasonable terms. This may apply either to an established garden or to land intended for the purpose. An established garden would be suitable enough for a middle-aged man, who would not care to commence business from the very beginning, and who would prefer to get an immediate return for his capital. He would, of course, have the disadvantage of having to take over the stock as it was, with all its faults of planting and perhaps overcrowding—faults in many old market gardens that could only be remedied at very great expense. A young and energetic man would be well advised to make a clean start, to plant his garden on the latest and most scientific principles, and to stock it with only the very best and most remunerative varieties of vegetables and fruit. Of course, it sometimes happens that a good bargain may be obtained in the way of a garden that has only been established a few years on these lines. Much time and money may thus be saved in such a case.

In connection with the purchase of freehold land it need hardly be mentioned that it would be well to obtain the services of a competent solicitor, as there are so many legal pitfalls into which the layman may easily drop before he is aware of it. A strict eye should be kept on tithes and other encumbrances that only come to light after everything has been "settled."

Capital Required.—It is impossible to give anything like a reliable estimate as to this, as conditions and prices vary so much in different parts of the kingdom. And so much depends upon whether a garden is rented yearly or on lease, or is purchased as a freehold. Assuming, however, that a man purchases a freehold of ten acres that is already fenced in or hedged round, and has a house, stabling, sheds, etc., attached, he should be able to place his hand on at least £200 or £300 to enable him to pay his way until his crops begin to turn into money. If he arranges to take possession at Lady Day instead of at Michaelmas, he will save about six months' expenses in labour, etc., and will commence taking money from the established fruit crops (such as gooseberries, for example) by the first or second week in June. These are points that a man brought up in the trade will know as well as anyone, but they are likely to be overlooked by one who takes a fancy to market gardening after he has tried perhaps at some other business.

Crops to Grow.—Assuming that one has the opportunity of starting a new market garden, and that all conditions are favourable, the first problem that arises is: how is the land to be planted or cropped to the best advantage? Taking 10 acres as a standard, it would be well to allot 7 acres to fruit culture, 3 acres to vegetables, and perhaps have a few flowers. The man who thoroughly understands fruit will probably plant nothing but fruit, and the same may be said of the man who specialises in vegetables and salads. A mixed garden, however, has the advantage of giving more than one string to the bow, and all the eggs are not in one basket. It sometimes happens that vegetables fetch very low prices, while fruit reaches a high figure, and one is therefore a set off against the other, even if the case is *vice versa*.

Out of the 7 acres of land devoted to fruit at least 4 should be devoted to apples, the other 3 being devoted to 2 acres of plums and 1 of pears. Taking everything into account, perhaps half-standard trees are more profitable than either standard or bush trees. The last named have certain advantages as regards the picking of the fruit, but they have the disadvantage of making it difficult to cultivate beneath them, also they prevent cropping underneath with currants, raspberries, or gooseberries, as may be done with standard and half-standard trees.

It is usual in most market gardens to plant apples and plums in alternate rows, the idea being that the plums are to be cut out after fifteen or twenty years so as to give more room for the apples. This seems a sensible enough plan at the beginning, as both apples and plums in the infant stages appear to have plenty of space. Anyone, however, who has seen a market garden planted in this way at the end of the time mentioned will realise that it is not a wise proceeding. The apples are planted at 18 or 20 ft. apart, but the space for each tree is reduced to 10 ft., with the quicker-growing plums between them. At the end of ten, fifteen, or twenty years the plums have grown well into the apples, and unless they are cut out, as originally intended, both plums and apples are bound to suffer. The apple trees are just in their prime and so are the plum trees, and it requires a peculiarly hard-hearted gardener to destroy at one swoop trees that are likely to yield perhaps two or three bushels of fruit each. If, however, the plums are not cut out or restricted, a few more years of growth will simply smother the plantation, and result in distorted trees that will be blown to pieces by the strong winds. This is what may be seen in almost any market garden over forty years of age.

It is a much wiser plan to plant only 160 half-standard trees to the acre—that is, one to every square pole or rod—even if apples and plums are to be in alternate rows. They will then have just about enough space to enable them to grow into shapely trees, and with judicious pruning they ought to last anything from fifty to a hundred years, at least in the case of apples. The intervening space between the rows may be cropped with vegetables during the earlier years, so that the best use is made of the ground until the trees become too large and cast too much shadow to make vegetable-growing profitable. Personally, we think it much better to have the apples, pears, and plums in distinct quarters by themselves.

It is then possible to plant a row of free-setting varieties between those that are reputed to be shy setters. It is obvious that a shy-setting variety of apple, for example, stands a much better chance of being pollinated from a free-setting variety standing next to it, rather than from a plum or pear tree standing in the same place. Having apples, pears, plums, etc., in quarters by themselves not only makes it easier and more economical for picking, but it also assists the bees in their search for honey. When these industrious insects are visiting apples they are not likely to visit the blossoms of cherries, pears, or plums at the same period. Consequently the chances of having the pollen carried from one tree to the next are facilitated by planting the same kinds (not varieties) of fruit together.

Intercropping with Bush Fruits.—Where half-standard or standard trees are used instead of bush trees, it will be possible and advisable to utilise the intervening space for currants, gooseberries, and raspberries. About 1500 currant or gooseberry bushes may be planted to each acre, or about 2000 raspberry stools. They may be planted between the rows of trees and also in a line with them, thus utilising space to the utmost. In the early years there will still be room for raising vegetables, but this must cease as soon as the bushes have filled out to occupy the space.

Other Fruits.—In certain parts of the country, such as Kent, cherries and cobnuts are popular crops. In most places, however, these are not attempted, but they should be grown when the local conditions are favourable. Strawberries, although a fruit in the technical sense, are also best grown in localities where they revel, such as in the neighbourhood of Southampton and Wisbech.

Varieties to Grow.—It is somewhat difficult to give a list of fruits that are likely to succeed in every part of the kingdom. One should look round the market gardens in any locality in which it is intended to plant, and find out which varieties "do" best in that particular neighbourhood. The following, however, may be taken as a good list of marketable fruits that are grown in large numbers in some parts of the country.

DESSERT APPLES. — Mr Gladstone, Lady Sudeley, Worcester Pearmain, and Devonshire Quarrenden for marketing in early and late August. These are all first-rate market varieties, but it may be remarked that while Worcester Pearmain is a great favourite with Middlesex and other growers, it is considered to be useless in the Wisbech area.

Cox's Orange Pippin, considered to be still the prince of dessert apples, does not thrive in every locality, and one should make quite sure of its cropping qualities before planting it largely. Where it does thrive it may be regarded as one of the surest moneymakers amongst apples. Allington Pippin and Charles Ross are both seedlings from this variety, and they are gradually being taken up by growers. Some say, however, they are too large for dessert purposes. This may be so in the case of young trees with only a few fruits upon them, but with heavier crops on older trees this objection is likely to be removed.

Beauty of Bath is an early variety, but it seems to be unreliable. James Grieve, however, is an apple that is likely to become generally grown. It has a touch of Cox's about it, and it seems to be a good cropper in most localities. The old King of the Pippins still wants a lot of beating where it does well, and the same may be said of Ribston Pippin. A reputation for canker has prevented the last-named variety from being planted much of late years. If, however, the soil is deeply tilled and of a genial nature, it does well. The reader may extend this list at will according to local knowledge.

COOKING APPLES.—The varieties here mentioned are looked upon as good reliable croppers, but there are many others that flourish as well, if not better, in various localities. Generally speaking, it will pay the market gardener to grow a few varieties of either dessert or cooking apples in large quantities, rather than have a small quantity of many varieties for market. The following varieties may be grown with safety in most places:—Emmeth Early (or Victoria), Keswick Codlin (an old variety, but nearly always reliable as a cropper), Bramley's Seedling (a great favourite in the Wisbech district), Warner's King, Newton Wonder, Stirling Castle (an excellent polleniser for other varieties, and also a heavy cropper), Lane's Prince Albert, Lord Grosvenor, Lord Suffield, Grenadier, Lord Derby, Bismarck, Golden

Spire, Wellington or Dumelow's Seedling, and others.

PEARS.—There are a host of varieties, but the market gardener will do well to confine himself to comparatively few, unless he has a very large acreage at his disposal. In old gardens the Duck Egg still holds a reputation which choicer varieties do not bear. It would not, however, be planted by any modern grower, as there are now many finer varieties that are more worthy of space. The Lammas is another very old Pear in the Home Counties. The Hessle (or Hazel, as it is always called) is a good market pear and grows better and finer in Middlesex probably than anywhere else. It is nearly always a good cropper, but misses a year now and again as in 1918. The Calebasse is also a good variety, and the same may be said of the Windsor, Glou Morceau, Marie Louise, and the old Jargonelle. Fertility is a very heavy cropper and is well worth planting. Among the choicer pears for market, Durondeau, Clapp's Favourite, Dr Jules Guyot, Conference, Souvenir du Congrès, Beurré Hardy, Beurré Superfin, Easter Beurré, Beurré Clairgeau are all proved varieties; while what is considered the finest pear of all—Doyenné du Comice—should find a good place either as a pyramid, standard, or as espaliers or cordons. Where any of these varieties (or any other, for that matter) do well, the grower can hardly make a mistake in planting them. For stewing purposes Catillac may be recommended, as it keeps till Christmas. It is unnecessary to give descriptions of these varieties, as they are detailed in almost every fruit catalogue.

PLUMS.—Rivers' Early Prolific, The Czar, Victoria, Prince of Wales, Belle de Louvain, Belle de Septembre, and Monarch are among the best market sorts. Gisborne is a heavy cropper and early, but it seems to be vanishing through the ravages of the terrible Silver-leaf disease — for which it may be emphatically said there is not at present either preventive or cure. The Pershore Plum is grown largely in places, and Heron is gradually making a name for itself. Orleans is a good plum and generally bears well, although it misses a season now and again. Pond's Seedling is a big red plum favoured by some; and in old gardens, Dovebank or Goliath often bears heavy crops, but is becoming obsolete.

Vegetables.— A market gardener will naturally grow the kinds he has most sale for, and he will also have them in great abundance so as to make it worth while preparing them for market. Amongst the most profitable crops are cabbages for spring, summer, and autumn use; cauliflowers and broccoli; Brussels sprouts and borecole or kale for winter and early spring use; lettuces (cos and cabbage), for all seasons if necessary; radishes as early in the year as possible and as long as possible, as they are nearly always sure to pay. Rhubarb is almost essential, and may be grown between trees if nothing else is on the ground, early supplies being obtained by covering the stools with litter as early in the year as possible. Onions are a good crop in all stages of growth if kept clean, and so are beetroot, carrots, leeks, parsnips, and turnips. Where the soil is of a nice silty nature and well exposed to the sun, asparagus is a profitable crop. Indeed, almost any kind of well-known vegetable will sell if properly grown, and the better it is grown and packed, the more likely is a ready sale at good prices. Broad Beans are nearly always grown when space permits, and also Runners and French Beans.

Flowers.—The modern market gardener does not despise growing flowers and bulbs wherever he can find room for them. Campanulas, chrysanthemums, daffodils, dahlias, foxgloves, irises, narcissi, paeonies, pansies, sweet peas, violas, and many others find a place in several gardens, where the revenue from them is often considerable, and helps to keep the gardener's spirits up when prices for other produce are perhaps below the normal.

From what has been sketched in this article it will be gathered that the market gardener is likely to be a very busy man, and must not only work hard with his hands, but also with his brains, if he is to make a success of his business.—J. W.

MARKET GARDENING: ADVICE TO WOMEN ON.— See *WOMEN GARDENERS.*

MARKETING HINTS. — See *FRUIT GRADING AND PACKING.*

MARKETING POTHERBS. — See *POTHERBS.*

MARL.—See *SOILS: THEIR ORIGIN AND NATURE.*

MARLING.—See *SOIL IMPROVEMENT.*

MARRAM GRASS.—See *AMMOPHILA.*

MARROWS.—See *VEGETABLE MARROWS.* For METHOD OF BOTTLING see *VEGETABLE BOTTLING.*

MARRUBIUM (WHITE HOREHOUND. Nat. Ord. Labiatæ).—This is a small genus of hardy herbaceous perennials of very easy culture but of no great garden value. It may be propagated by seeds, cuttings, or root division at the usual times. It must be distinguished from the form of Horehound referred to in our article on *BALLOTA*, which see. As a medicinal plant White Horehound is now discredited.

The best known species is *M. vulgare*, a weedy plant known to collectors as the COMMON WHITE HOREHOUND. *M. Pseudo-dictamnus* is now considered synonymous with *Ballota Pseudo-dictamnus* (see *BALLOTA*). Choicer species are *M. astracanicum* (blue) and *M. catariaefolium* (purple). Both bloom in July, and average 12–18 ins. in height.

MARSH ARROW-GRASS.—See *ARROW-GRASS.*

MARSH BUCKLER FERN (*Nephrodium Thelypteris*).—See *FERNS AND FERN GARDENING.*

MARSH HEATHER (*Erica Tetralix*). See *HEATHS.*

MARSH HEDGEHOG GRASS (*Carex flava*).—See *CAREX.*

MARSH MALLOW. — See *ALTHAEA* and *MALVA.* See also under MALLOW in *MEDICINAL HERBS.*

MARSH MARIGOLD.—See *CALTHA* and *WATER GARDEN: PLANTS FOR THE.*

MARSH ORCHIDS (*Orchis latifolia*). See *HARDY ORCHIDS.*

MARSH OX-EYE DAISY (*Chrysanthemum lacustre*).—See *CHRYSANTHEMUM.*

MARSH SHIELD FERN (*Nephrodium Thelypteris*).—See *FERNS AND FERN GARDENING.*

MARSH SPURGE (*Euphorbia palustris*). See *EUPHORBIA.*

MARTAGON LILY (*Lilium Martagon*). See *LILIES.*

MARTYNIA.—See *ANNUALS, HALF-HARDY: LIST OF,* and *UNICORN PLANT.*

MARUTA.—Now included in the genus *ANTHEMIS.*

MARVEL OF PERU (*Mirabilis.* Nat. Ord. Nyctaginaceæ).—This is a genus of greenhouse or half-hardy herbaceous perennials easily raised by seed sown in a warm house or hotbed. When sufficiently strong the plants should be hardened off to stand in the open border. The roots should be lifted in the autumn and preserved in dry sand or moss during the winter. The plants are, in fact, treated exactly like *DAHLIAS*, which see. The seed is generally sold in mixtures and germinates freely in rich sandy loam. Temperature needed 40–50° F.

What to Grow.—We recommend the following :—

Mirabilis dichotoma. — Yellow. Flowers in July and August. Height, 2 ft.

M. longiflora. — White. Flowers in July and August. Height, 2 ft.

M. longiflora carnea. — Pink. Flowers in July and August. Height, 2 ft.

MARY'S THISTLE. — See HOLY THISTLE in *MEDICINAL HERBS.*

MASDEVALLIA.—See *ORCHIDS.*

MASIRO GUMI (*Elaeagnus umbellata*). See *SHRUBS.*

MASK FLOWER.—See *ALONSOA.*

MASTER-WORT (*Peucedanum Ostruthium*).—See *PEUCEDANUM.*

MAT-WEED.—See *NARDUS.*

MATRICARIA (Nat. Ord. Compositæ). — The common MAY WEED of the cornfields is closely allied to the Chamomile and Feverfew, and is something of a pest, but under cultivation it has been turned into a beautiful decorative plant, which, while not an annual, may be treated as such, and raised from autumn or spring sowings. Planted out about 6 ins. apart in early May plants of the double-flowered varieties will subsequently produce a mass of snow-white blooms raised a foot or more above the ground. In modern botany the genus Matricaria is merged into Chrysanthemum.

Matricaria inodora flore pleno, the botanical name of the above, is a white summer and autumn flowering plant. Its variety *Bridal Robe* is about 1½ ft. high, and is fine alike for grouping or cutting. *Snowball* is suitable for borders or beds, or for cutting, and grows 2–2½ ft. high.

Perennial Border Species.—These when compared with the above are comparatively poor, though of very easy culture. The best is *M. Tchihatchewii,* a white species blooming in July, and growing about 12 ins. high. It spreads too rapidly for choice places.

See also under CHAMOMILE and FEVERFEW in *MEDICINAL HERBS.*

MATS.

Archangel and Dunnage mats are quite the best for use in the garden, and last if properly looked after for a long period. In practice, however, old carpets, door-mats, old rugs, and other similar materials are pressed into service for protecting frames, etc. Mats after use should be well shaken and either laid out or hung up in some warm place to dry thoroughly before being put on the frames the following evening.

MATTHIOLA.—See *STOCKS.*

MATTOCKS.—See *GARDEN TOOLS.*

MAURANDYA.—For best species see *CLIMBING AND TRAILING PLANTS.*

MAXILLARIA.—See *ORCHIDS.*

MAY APPLE (*Podophyllum peltatum*). See *PODOPHYLLUM.*

MAY BUG.—See under CHAFERS in *INSECT PESTS.*

MAY-FLOWERING TULIPS. — See under TULIP DIVISIONS in *TULIPS.*

MAY WEED.—See *MATRICARIA.*

MAZUS (Nat. Ord. Scrophulariaceæ).—A genus of dwarf trailing and creeping plants which thrive in sunny positions in well-drained soil in the rock garden or border. They are propagated by division in the autumn or spring. There are two species suitable for the rock garden.

Mazus Pumilio.—A creeping plant. Flowers pale violet, large. Site sunny. Soil sandy loam in joints of flagstones or rocky places. Flowering Period, May to July. Height, 2 ins.

M. reptans.—A prostrate species. Flowers pale violet, spotted. Site sunny. Soil moist, well-drained. Flowering Period, June to July. Height, 2 ins.

MAZZARD (*Prunus Avium*). — See *TREES.*

MEADOW CLOVER (*Trifolium medium*).—See *TRIFOLIUM.*

MEADOW FESCUE (*Festuca elatior pratensis*).—See *FESTUCA.*

MEADOW GRASS.—See *POA* and *WEEDS.*

MEADOW PARSLEY (*Œnanthe pimpinelloides*).—See *ŒNANTHE.*

MEADOW RUE.—See *THALICTRUM.*

MEADOW SAFFRON.—See *COLCHICUM*, and under CROCUS, AUTUMN, in *MEDICINAL HERBS.*

MEADOW SAGE (*Salvia pratensis*).—See *SALVIA.*

MEADOW SAXIFRAGE.—See *SESELI.*

MEADOW SWEET (*Spiraea Ulmaria*). See *SPIRAEA.*

MEALIES (*Zea Mays*).—See *MAIZE, OR INDIAN SUGAR CORN*, and *ZEA.*

MEALY BUGS.—See *INSECT PESTS.*

MEALY CENTAURY (*Centaurea dealbata*).—See *CENTAUREA.*

MEALY PLUM APHIS.—See *INSECT PESTS.*

MEASUREMENTS OF AREA.—See under MISCELLANEOUS MEASURES in *WEIGHTS AND MEASURES.*

MEASURERS. — See under WINTER MOTHS in *INSECT PESTS.*

MEASURES. — See *WEIGHTS AND MEASURES.*

MEASURING RODS.—See *GARDEN TOOLS.*

MEAT MEALS. — See FISH MEALS under PHOSPHO-NITROGENOUS MANURES in *MANURES.*

MECONOPSIS (HIMALAYAN POPPY. Nat. Ord. Papaveraceæ). — This family includes some useful plants for garden decoration, most of which are of easy culture, thriving in any ordinary light garden loam containing plenty of grit, in a sunny or lightly shaded spot. The annual and biennial species are best propagated by seeds sown in the usual way and at the usual times for such subjects; the perennial species may be increased by division of the roots in March or April, which months are the best times for planting, and also they may be raised from seeds sown in a frame at that time. With regard to the duration of each species, it is stated according to the authorities at Kew. The genus is one upon which much further study may profitably be expended.

Annual Species.—These are perhaps the least important. We recommend the following:—

Meconopsis heterophylla (Syn. *M. crassifolia*).—This attractive species bears orange-red flowers from June to September, and grows about 1 ft. high.

Biennial Border Species. — Excluding the three biennial species described under the rock garden species below, which are not very suitable for border work, we recommend the following:—

Meconopsis nepalensis (NEPAUL POPPY).—This showy plant bears purplish flowers in August and September, averaging 2½–5 ft. in height.

M. paniculata.—This is an ornamental species bearing pretty yellow flowers from midsummer onwards, and growing 3–6 ft. in height.

M. Wallichii (SATIN POPPYWORT).—This is a favourite species bearing attractive blue flowers from June onwards into the autumn. Its average height is 3–6 ft., but when drawn up it may exceed 7 ft.

Perennial Border Species.—Only one species is strictly perennial. This, *Meconopsis cambrica*, the well-known WELSH POPPY, is very suitable for the herbaceous or mixed border if a shady spot can be found for it. We describe it fully in the rock garden species below.

Rock Garden Species.—The following four species are suitable. These need a shady corner, and are propagated by seeds sown in heat in March. *Meconopsis cambrica* is a hardy perennial; the others are hardy biennials.

Meconopsis aculeata.—This is of erect habit, and its leaves are covered with white hairs. Flowers blue. Site, shade. Soil peat and loam. Flowering Period, May to June. Height, 2 ft.

M. cambrica (WELSH POPPY).—This is of tufted habit. Flowers yellow. Site, shade. Soil rocky. Flowering Period, May to September. Height, 1 ft.

M. racemosa.—This has its entire leaves in rosettes. Flowers blue. Site, shade. Soil peat and loam. Flowering Period, May to June. Height, 2 ft.

M. simplicifolia.—This is a somewhat trying sort to grow, and bears rosettes of entire leaves and single-flowered scapes. Flowers blue. Site, shade. Soil peat and loam. Flowering Period, June. Height, 1 ft.

Other species suitable for this purpose are *M. integrifolia*, with yellow flowers; *M. latifolia*, pale blue; and *M. Pratii*, dark blue.

NEW VARIETY.

Meconopsis simplicifolia, Bailey's Variety.—This has hairy leaves and sky-blue flowers, with deep blue filaments and yellow anthers. It grows about 16 ins. high.

MEDICAGO (MEDICK. Nat. Ord. Leguminosæ).—This is a large genus of hardy annuals and hardy herbaceous perennials of the easiest culture, though not much grown. The most interesting species is *M. Echinus*, the well-known CALVARY CLOVER, best raised as a half-hardy annual and planted out. Other species are more useful to the farmer, such as *M. maculata* (Syn. *M. arabica*), the HEART CLOVER, and *M. sativa*, the useful forage crop known as LUCERNE. Two other species we may mention are *M. lupulina*, the BLACK MEDICK, and *M. scutellata*, the SNAIL MEDICK. These are not of much garden value.

MEDICINAL HERBS.

Introduction.—Until August 1914 the British druggist was accustomed to import the greater proportion of the Vegetable Drugs that he required from foreign countries, including a very large number from Germany, and when the War stopped this importation, as was but natural, the prices of these drugs rose enormously, and in some cases it was impossible to obtain supplies at all.

Realising the necessity of growing the more important Medicinal Herbs in this country, the Board of Agriculture issued a leaflet, No. 288, urging their cultivation and collection. This was taken up by the public, and all and sundry started growing and collecting Herbs, sending to druggists many useless samples which had to be destroyed.

To encourage the growing of Herbs in British gardens, we are describing a very large number of those used in medicine, giving some brief cultural notes where necessary, and information as to the part required. We think that this article on Medicinal Herbs is one of the most important features of the work, as no such comprehensive notes on all the principal Medicinal Herbs have as yet found a deserved place of honour in other gardening works. There are one or two special books on Herb Gardening it is true, and many pamphlets, but since Herb Growing is, we are sure, going to be an important industry now the War is over, we give it more space than would otherwise seem necessary.

The writer of the Herb Notes is an expert in her subject, and we are indebted to her for the trouble she has taken in giving us the practical information we desire. Reference should also be made to the article on *HERB GARDENING* by another Herb Growing Expert, and a plea may well be made for the systematic study of this all-important subject. Fortunately there is a School of Herb Growing now at Chalfont. St. Peter, Bucks, where those who have time, and who wish to take up the industry seriously, may go and study the whole question under expert Herb growers. For women and discharged soldiers who are unable to follow the more strenuous sides of Gardening, such as Fruit Growing and other similar work where much hard labour is required, Medicinal Herb Growing as a profession should commend itself, as after the experience has been gained, all it needs is patient trouble and light hand work. Many of the Herbs grow better in England than in other countries, though this fact is not generally known, and there is an enormous scope for those who have sufficient patience in the improving of drug-yielding Herbs. A case in point may be mentioned in Aconite (*Aconitum Napellus*), of which there are so many garden varieties. Careful trials should be made, and the sorts determined which contain the largest percentage of the drug. Again, species with a poor drug-bearing capacity but of easier culture, might well be crossed with those of more difficult culture which contained a larger portion of the drug, in the hope of obtaining a plant of easy culture with a fair drug-bearing capacity. These are only a few of the many possibilities of the subject.

Regarding the matter of drying the Herbs, this is probably the most important part of the industry, but it is by no means a simple matter, and thus we are unable to give full details here. The main thing for the gardener to do is to grow the Herbs, and communicate with the School of Herb Growing, or the various Herb Growing Associations, who will buy the herbs in an undried condition, and dry them at their own expense in their own apparatus. Amateurs are almost certain to spoil the Herbs if they attempt to dry them in their own way.

It may be asked which are the dozen Herbs which are most in demand, and we may say that these are the following: Aconite Roots, Asparagus Roots, Belladonna (whole Herb), Burdock Roots, Buttercup Roots, Comfrey Roots, Dandelion Roots, Dock Roots, Iris Roots, Meadowsweet Roots, Parsley Roots, and Rhubarb Roots. Only a few days ago the present writer received a letter offering to buy any quantity of these dozen Herbs for Medicinal purposes, from a Herb drying house, and his only regret was that up to the present time his energies have been entirely concentrated on vegetable growing, and that thus Herb Growing and collecting have been out of the question.

It is, of course, of great importance that leaves, flowers, or Herb Roots should be carefully packed, as otherwise they may become spoiled or damp in transit, and then be of no use when they reach their destination. One School of Herb Growing offers to pay prompt cash for any consignments fit to use on arrival, and points out that as a rule a sample must first be sent, as it takes no responsibility for consignments arriving without any previous intimation. In conclusion, it may be well to point out that any question relating to technical points on Herb Growing should be addressed, not to nurserymen, as is usual, who have not made a special study of this subject, but to the Herb Growing Schools, and the local Herb Growing Associations. We now give notes on all the important Medicinal Herbs below, under the names by which they are known to Herbalists. The letters following them signify as follows: *B.P.*, British Pharmacopœia; *B.P.C.*, British Pharmaceutical Codex; *H.*, Homeopathy; *S.*, Simple, *i.e.* Herbalist Drug.

Aconite (*Aconitum Napellus*. Syns. MONKSHOOD, WOLFSBANE. Nat. Ord. Ranunculaceæ), *B.P. & H.* — This is used as an anodyne, febrifuge, and diuretic. It is one of the most important of the pharmacopœial plants, and requires careful cultural study for the improvement and standardising of the strain. It is the source of a powerful and poisonous alkaloid, Aconitine.

DESCRIPTION. — Monkshood is a fairly well known plant, and often cultivated in gardens; it is also found in the wild state. Its tall blossoming spike, unlike the larkspurs, is composed of dark purplish-blue flowers, the topmost petal of which is boldly helmet-shaped, or somewhat like a monk's hood. It is a perennial, growing in damp, shady places, and blossoming from June to September. Every part of the plant is highly poisonous.

CULTIVATION.—Seed will not as a rule germinate unless sown as soon as it is ripe in August, but propagation is simpler by division of the roots. The Homeopathic Pharmacopœia recognises three foreign species of Aconitum in addition to *Aconitum Napellus*, but the B.P. mentions only the latter. Catalogues of the larger horticultural firms enumerate ten or eleven differently named and coloured Aconites, all of which succeed under the shade of trees and may be grown in the ordinary way as border or shrubbery plants in moist and slightly retentive loamy soil. There are twenty-four or more wild varieties, but it is not known how far these vary in medicinal value, nor which are the strongest growers. Cultural experiment to determine these points would be of great service to British medicine, and to the British herbal industry.

MARKETING.—The root from mature plants is the part required. The cultivated root is greatly superior, from a medicinal point of view, to the wild root marketed by collectors. The herbaceous parts of the plant are not required, although seed might always be saved. The roots should be dug in autumn when the leaves have died away. They should not be washed but shaken free from mould and dried on open-meshed sieves or racks in a current of warm air until they are shrunk and firm and break with a brittle fracture. The grower should carefully study the appearance of a good sample of the commercial article—to be obtained probably through the courtesy of any chemist—and should read the official description of this in the B.P. under the heading "*Aconiti Radix.*" He must remember that all parts of the plant are highly poisonous, and that the root has often been mistaken, with fatal results, for that of horseradish. Only intelligent persons should deal with the harvesting of this crop, and only then if their hands are free from wounds or abrasions or are protected by gloves. The current price of Aconite root per pound or per ton may be ascertained by consulting any of the commercial journals of the pharmaceutical trade. This remark holds good with regard to all the more important materia medica.

Agrimony (*Agrimonia Eupatoria.* Nat. Ord. Rosaceæ), *S.*—A well-known, almost ubiquitous perennial herb which is required by certain firms of druggists in such quantity that it has been mentioned among wild plants as one which would possibly repay for cultivation.

American Horsemint.—See article on *POTHERBS.*

Anemone.—See under PASQUE FLOWER farther on.

Angelica (*Angelica Archangelica.* Nat. Ord. Umbelliferæ), *S.*—This is used as a stimulant, carminative, diaphoretic, and expectorant, also used in the confectionery trade for flavouring purposes.

DESCRIPTION.—The plant occurs wild only as an escape from cultivation. It is tall, stout, and perennial, and has large leaves and umbels of greenish-white flowers. See *Flowers of the Field*, fig. 220.

CULTIVATION.—Sow seed in the open in March in a damp sandy soil, and thin out seedlings to about 18 ins. apart, as soon as large enough.

MARKETING.—The well-grown succulent stalks are chiefly required. There is also a market for the seed and roots. All need to be dried. Angelica should not be grown as a speculation, but only in response to ascertained requirement.

"Aniseed."—The B.P. preparations from Anise fruit (so-called "seed") are derived from two plants: one, *Pimpinella anisum*, belonging to the Natural Order Umbelliferæ; the other, *Illicium verum*, belonging to the Natural Order Magnoliaceæ. The former is cultivated in Egypt, Germany, Spain, and elsewhere; the latter in warm countries. The medicinal properties of these fruits are aromatic, carminative, and pectoral, but it is to be doubted if their cultivation could be undertaken with any degree of commercial success in this country.

Balm.—See article on *POTHERBS.*

Basil.—See article on *POTHERBS.*

Bearberry (*Arctostaphylos Uva-ursi.* Nat. Ord. Ericaceæ), *B.P. & H.*—This is used as an astringent, diuretic, and sedative to the bladder.

DESCRIPTION.—A small prostrate perennial shrub found in moorland country and on mountainous heaths. It has small evergreen leathery leaves, rose-coloured flowers (May to June), and scarlet berries.

CULTIVATION.—It can be grown from seed taken from wild specimens, but only in localities similar in character and altitude to its native habitat.

MARKETING.—Separate the leaves from the stalks and thoroughly dry.

Belladonna (*Atropa Belladonna.* Syn. DEADLY NIGHTSHADE. Nat. Ord. Solanaceæ), *B.P. & H.* — A powerfully poisonous perennial plant. See precautions as to growing and harvesting noted under ACONITE. It finds application as a narcotic, anodyne, mydriatic; and is the source of the important alkaloids Atropine, Belladonine, etc.

DESCRIPTION.—Belladonna is found in the wild state, but it cannot be said to be common. It is a stout, erect herbaceous plant which branches and often attains a height of 3–4 ft. Its leaves are large, stalked, ovate in shape with an acute apex, and grow in unequally sized pairs. The flowers are axillary and solitary, purple and bell-shaped. The fruit is like a small black cherry with a persistent calyx. It is found in quarries and about old ruins, in shady places on chalk and limestone soils.

This plant is one of the most important from a medicinal, and remunerative from a commercial point of view, to which the herb grower can devote his time and attention. It is one of the comparative few for which there is always a demand and a market; one of those, moreover, which would repay for expert cultural study. As more information has been forthcoming in the pharmaceutical and horticultural press on belladonna growing than on any other medicinal herb, it seems unnecessary to take up space here on the matter.[1]

MARKETING. — The roots, leaves, and seeds are required, the former chiefly, which should be four years old. From first year plants leaves may be gathered in September. In the second season the entire crop is sickled down when in flower in June, and a second crop is available usually in September from the same plants. The same remark applies to the third year. In the fourth year only part is harvested as above, the rest being left to seed, which is usually ripe in September. The root can then be dug in November. It must be noted that the leafage should be consigned to the buyer the same day or carefully dried at once, otherwise it will ferment in a few hours and be spoilt.

Betony (WOOD BETONY). — See article on *POTHERBS.*

Bistort (*Polygonum Bistorta.* Syns. SNAKEWEED and SNAKEROOT. Nat. Ord. Polygonaceæ), *S.*—A highly astringent herb in action, said to be valuable as a wine in the early stages of phthisis. The herb was at one time much cultivated for its medicinal qualities and is not unlikely to revive in favour, since these have again been recently recognised and scientifically confirmed.

DESCRIPTION.—A handsome perennial plant about 2 ft. high, found growing in circular patches in moist meadows. Leaves radical and cauline, ovate; flowers (produced from June to September) pink, in dense terminal spikes.

CULTIVATION.—Any portion of the twisted rhizome or underground stem will grow, so that it is only necessary to transplant a piece of this to the space allotted to bistort in the herb-garden to secure a crop. The plant, indeed, is very hard to eradicate once it has gained a hold. It flourishes in most ordinary soils, especially if they are moist and in a good state of cultivation.

MARKETING.—The rhizome is dug in September from plants not more than two to three years old. It should not be washed, but freed from earth, and dried like any other root crop.

Blue Bottle.—See CORNFLOWER.

Borage.—See article on *POTHERBS.*

Buck Bean (*Menyanthes trifoliata.* Nat. Ord. Gentianaceæ), *H.*—A beautiful but little known plant found in water or very wet situations. Its cultivation should be confined, for the present, to encouraging its increase in its natural haunts.

MARKETING.—The entire herb is wanted.

Burdock (*Arctium Lappa.* Nat. Ord. Compositæ), *B.P.C.*

DESCRIPTION.—A well-known biennial plant found all over the country, chiefly on roadsides and in neglected corners of fields. It sometimes grows to a very considerable height and forms familiar rough burr-like heads of seed which cling to everything they touch.

CULTIVATION.—Burdock is much pressed not only upon the collector's attention, but upon that of the herb grower. The dried root from plants of the first year's growth is the part chiefly required, although there is also a market for the leaves and seed. Burdock succeeds well in almost any soil provided it is rich in humus and well drained. The seed may be sown out of doors early in the spring in drills 18 ins. to 3 ft. apart, and not more than 1 in. deep. Seedlings should be thinned out to a foot apart to allow for the growth of the large leafage, and the plants should be carefully cultivated as long as their size will permit. At the end of the first year's growth the tops may be cut and the roots turned out with a deep-running plough, or beet lifter. Extra large or deep-growing roots will require hand digging to prevent breakage and injury.

---

[1] Miss Teetgen's *Profitable Herb Growing and Collecting*, published by Country Life Ltd., deals with the culture of this herb very fully, and a useful leaflet on it entitled *Belladonna* has been published by Mrs. Grieve, of Chalfont St. Peter.—EDITOR.

MARKETING.—Burdock root is large, thick, and heavy. It should not be washed, but shaken or rubbed free of soil, and dried in artificial heat (to about 100° F.) until it breaks with a short fracture. Slow, natural drying merely shrivels the root and it will not snap at all, but is leathery and tough. It loses very considerably in weight and in size in drying, some five tons of the fresh material being required to yield one of the commercial product.

Calamint.—See article on *POTHERBS*, and separate article.

Calamus.—See SWEET SEDGE.

Caraway (*Carum Carri.* Nat. Ord. Umbelliferæ), *B.P.*—This is used for aromatic and carminative purposes.

DESCRIPTION.—A biennial herb growing to about 2 ft. in height, found wild only as an escape from cultivation, and bearing small greenish blossoms. Leaves bi-pinnate and much cut.

CULTIVATION.—This is similar to that for CORIANDER, DILL, and FENNEL (which see), and is entirely suitable to be carried out on a small scale of farming. The plant succeeds well in a loam or stiff clay soil.

MARKETING.—Reap at the end of the second season. The so-called "seed," or fruit, is thrashed out just before it is quite ripe. It must be "clean," dry, and graded according to size.

Cascara Sagrada (*Rhamnus purshianus.* Nat. Ord. Rhamnaceæ), *B.P.*—A powerful cathartic.

CULTIVATION AND MARKETING.—This is not a British plant, but an American. There is no climatic or cultural reason, however, why it should not be grown in this country as a hedge tree. The bark is required, and the B.P. directs that it should be collected (and dried) one year before use.

Catmint.—See article on *POTHERBS*, and separate article.

Chamomile (*Anthemis nobilis.* Nat. Ord. Compositæ), *B.P. & H.*—This is used as an aromatic stimulant and bitter tonic. The herbal infusion of Chamomile flowers, which should be clear and brilliant as a very pale sherry (without filtering), taken in wineglassful doses before meals three times a day, is an excellent appetite restorer. It can be flavoured with a dash of lime or lemon juice if desired.

DESCRIPTION.—Chamomile (often also called ROMAN or COMMON CHAMOMILE) is found in the wild state growing generally in sandy waste places all over the country. Its finely cut thread-like leaves and daisy-like heads need little description. But the medicinal plant is a carefully cultivated variety bearing double flowers, and could not, probably, be satisfactorily grown from seed collected from the wild. It is a perennial zealously kept true to required strain by division of the roots, and by subsequent careful culture. The tendency is to go back to the single-flowered variety. GERMAN CHAMOMILE (*Matricaria Chamomilla*) is also a common English annual herb very much like the wild Roman Chamomile. It is sometimes called WILD CHAMOMILE to distinguish it from the latter. Roman Chamomile has a flat or slightly depressed floral disk or "capitulum"; German Chamomile has a protuberant conical disk. The distinction is important. German Chamomile tends to produce the requisite double blossoms if carefully grown on stiff black loam, which soil also produces the heaviest crop of Roman Chamomile, so that the two are often cultivated and harvested together under similar conditions. If either are grown in soil too rich, the product is not satisfactory, the size of the centre of the flower being reduced. The single blossom should never be offered or substituted for the double, but merely encouraged to become double itself under suitable conditions.

CULTIVATION.—It is not safe to raise Chamomile from seed owing to this variability in the quality of the blooms produced, but by division of the roots of tested and satisfactory stocks. Each plant throws off ten to twelve suckers or "offsets." Divided up accordingly, the new roots should be set out in March at intervals of 18 ins. apart, in rows 2 ft. asunder, and pressed firmly into the bed. They require careful weeding by hand rather than by hoe, also water until established, and spread rapidly. Old clumps should be divided and replanted every second year.

MARKETING.—The flowers are required; they should be picked on dry days only, after the morning dew is past, as they appear throughout the season from July to September, and be dried quickly in small instalments to preserve the whiteness as much as possible. Chamomile is sorted and graded and valued entirely by colour; brown and yellowed blossoms detracting greatly from the product. From 5 to 6 lb. of fresh flowers produce 1 lb. of dry. The market for Chamomile is steady and fairly remunerative.

Chervil.—See article on *POTHERBS*.

Chicory (*Cichorium Intybus*. Nat. Ord. Compositæ).—This is used as a flavouring agent.

CULTIVATION.—A well-known tall blue-flowered perennial, which thrives in chalky soil. Sow seed in well-dug ground in April.

MARKETING.—The root is the part required. Dig in the autumn of the second year. See also article on *SALAD PLANTS*.

Comfrey (*Symphytum officinale*. Nat. Ord. Boraginaceæ), *H.*—This is used as a demulcent and astringent.

DESCRIPTION.—A tall forage plant, with large rough leaves and a row of drooping white or mauve flowers borne on one side only of the stalk.

CULTIVATION.—The plant will grow well in moist situations, and is easily propagated by division of the roots in the spring.

MARKETING.—The herbaceous portion harvested and dried in May is chiefly required, also the root, which should be root dried in October.

Coriander (*Coriandrum sativum*. Nat. Ord. Umbelliferæ), *B.P. & H.*—This is used as a carminative and aromatic.

DESCRIPTION.—A slender annual with few-rayed compound umbels with white, sometimes slightly pinkish little blossoms, the outer ring of which have larger, more conspicuous petals than the central ones. It flowers in June, and the "fruit" is set shortly afterwards.

CULTIVATION.—Coriander is quite an easy herb to grow. Its culture, like that of CARAWAY, DILL, and FENNEL (which see), needs to be encouraged and increased in this country and should be undertaken on a farming scale, or by a group of small growers in one district on a co-operative basis. It should be sown in ploughed, well-prepared ground early in the spring in shallow drills 2–2½ ft. apart. The crop likes a warm light soil, but will also succeed on loam and clay. Seed germinates quickly.

MARKETING.—The herb is mown down before the "fruit" is quite ripe, and after an interval during which this matures and dries, the heads are thrashed. The "seed" is sold at about 5d. per lb. It is very rich with highly aromatic oil. There is a steady demand for it.

Cornflower[1] (*Centaurea Cyanus* and other varieties. Syn. BLUE BOTTLE. Nat. Ord. Compositæ).

DESCRIPTION.—A familiar garden plant, easily grown.

MARKETING.—The florets are the parts required by the perfumery trade. Dry according to the general directions for blossoms.

Crocus, Autumn (*Colchicum autumnale*. Syns. COLCHICUM, MEADOW SAFFRON. Nat. Ord. Liliaceæ), *B.P. & H.*—A specific for gout, valuable as a diuretic and purgative.

DESCRIPTION.—A pale mauve crocus which blooms in the autumn without leaves.

CULTIVATION.—One of the most important of the pharmacopœial plants, but highly poisonous. (See precautions in handling under ACONITE.) It can be grown from seed with a view to planting out in damp, marshy, or meadow ground, where there is no risk to grazing animals. It may be sown in the open on a bed of prepared soil any time from May onwards, and very lightly covered. It may not sprout until the following spring. The two-year-old plants should be set when transplanted about 3 ins. apart, unless they are dotted about the ground in irregular order. The Colchicum exhibits first its leaves only, and when these completely die down, the purplish-pink blossom appears in August or September. The locality of the flowers should be carefully noted in order to lift the corms later. If grown from "corms," plant these in groups of twelve, setting them 8 ins. deep. Allow them to establish themselves for a few years.

---

[1] See also separate article on this flower.—EDITOR.

MARKETING.—The roots of the plant go very deeply into the soil and often go in crooked, so that they require to be taken up by means of a bulb lifter, unless the whole plantation is ploughed. The "corms" should be collected from plants of two years' growth, and the seed, when the capsules are ripe. The market for both is steady and worth meeting. The seed requires drying, and the corms, divested first of their outer layers, are sliced, and dried in artificial heat. Chemists should be asked to show a specimen of the commercial article, and B.P. description consulted.

Crocus, Saffron (*Crocus sativus*. Nat. Ord. Iridaceæ), *B.P.C. & H.*—A drug used for colouring purposes is obtained from this plant, popularly known as SAFFRON.

DESCRIPTION.—A purple spring flowering crocus.

CULTIVATION AND MARKETING.—Plant the "corms" in November or some seed in the spring. The yellow stigma is the part required, but such an enormous acreage of crocuses would be necessary from which to derive even a few ounces of the dry drug, that saffron culture cannot be recommended to the would-be herb grower. The plant must not be confused with Autumn Crocus, or Meadow Saffron, nor with the Safflower.

Dandelion (*Taraxacum officinale*. Nat. Ord. Compositæ), *B.P. & H.*—This is useful as a diuretic, laxative, and tonic. It is too well known to need description. Its culture as a salading is dealt with in the article on *SALAD PLANTS*.

CULTIVATION.—Dandelion root is much used in official British medicine, and although the plant is so ubiquitous and so common it is not one which can be left wholly to collectors. In the first place the root is wanted every year in great quantity, and in the second, this root should be of good size and shape and growth, unlike the inferior or much forked specimens derived from ground unfavourable to their development. Where Dandelion can be collected from rich, moist pastures, the root is probably as good as that from cultivated gardens, but the little wayside roots extracted from stony or poor waste ground are worth nothing. In proportion as good ground is now being brought under cultivation, the natural preserves of marketable Dandelion will grow less and less, and the herb will require more and more to be cultivated. Tap roots should be as uniform in size and shape as possible. They tend to fork from two causes—either through encountering stones or other obstacles in their descent through the soil, or because this is too dry at a depth, and whatever moisture there is, is to be found nearer the surface. The first requisite, then, for fine Dandelion culture is well and deeply prepared moist ground. A good loam or clay is best. About 4 lb. of seed per acre are drilled in rows a foot apart, and the crop requires to be diligently weeded. As only the roots are needed, growers must prevent the formation and spread of the seed by cutting down the flower-heads as they appear. (These, indeed, can be marketed, and fetch about 10d. per lb. dried.)

MARKETING.—The roots are dug in the autumn of the second year. The yield should average 4–5 tons of fresh root per acre, and the price 10s.6d. per cwt. for these undried. The roots should be dug in dry weather, and they had better not go through any process of washing for fear of mould or mildew making its appearance as they are stored. Growers who specialise on other root-crops such as Burdock, Chicory, and Valerian, would probably undertake the drying also of this crop, since what may be described as the "technique" of the process is much the same in all cases.

Deadly Nightshade.—See BELLADONNA in this article.

Dill (*Peucedanum graveolens*. Nat. Ord. Umbelliferæ), *B.P. & H.*—This is used for aromatic and carminative purposes.

DESCRIPTION.—An annual somewhat like Fennel in appearance but with smaller leaves. Its well-known preparation—DILL WATER—is largely used for soothing restless infants.

CULTIVATION AND MARKETING.—See notes on CARAWAY, CORIANDER, FENNEL, LINSEED, and SUNFLOWER for scope and general management. This crop is easily grown and may pay well as time goes on. Cultivation is similar to that of spring oats, about 10 lb. of seed being drilled to the acre, and careful attention given to the destruction of weeds. The plants require much watching as the time for harvesting approaches, since the fruits do not all mature at once, but in succession. Consequently, the first to ripen fall, and waste, unless immediate steps are taken. The crop should be mown down early, and the unripe heads allowed to mature later. In dry periods cutting is best done in early morning or late evening. The loose sheaves are built into small stacks of about twenty sheaves tied together. In hot weather thrashing may be done in the field. The crop is considered rather exhaustive of soil fertility, so that it should not be sown two years in succession on the same ground unless this has been well manured in the meantime. The yield of Dill fruit should be about 7 cwt. per acre.

Dock (*Rumex aquaticus* and *R. crispus*. Nat. Ord. Polygonaceæ). —A plant finding application as an alterative and tonic, and too well known to need description.

Marketing.—Two or three species of Dock have a value in herbalist medicine. The root is the part required.

Dog Rose.—See under Rose, French.

Elder (*Sambucus nigra*. Nat. Ord. Caprifoliaceæ), *S.*—A plant used for aromatic, alterative, aperient, and emollient purposes, etc. Both the berries and flowers are required.

Marketing.—This is a herbal crop for the collector rather than the grower. The flowers are dried on the umbels. Consult any good Collector's manual.

Elecampane (*Inula Helenium*. Nat. Ord. Compositæ), *B.P.C. & H.*—This herb is used as an expectorant, carminative, diaphoretic, and tonic.

Description.—A stout perennial with large, bright yellow, ragged flower-heads, solitary at the top of the stems. It is found occasionally in the wild state in damp meadows or shady spots, but possibly only as a naturalised escape from cultivation. It is grown in materia medica gardens for the sake of the root, which is the part required.

Cultivation.—Seed may be sown on fine beds in the spring and transplanted later to the field, but these do not flower the first year. The usual method of propagation is by the division of old roots. Elecampane will grow in almost any soil, preferably a clayey loam, but the ground must be deeply dug or ploughed and well prepared before planting. A moist, shady locality will best meet its requirements. The offsets taken from the old roots, with a "bud" or "eye" to each, should be planted in the autumn about 18 ins. apart, in rows 2–3 ft. asunder. A proportion of such pieces of root may be kept in gentle heat under glass throughout the winter, with the object of raising a reserve stock of plants. The seedlings will not require thinning out, but they must be kept weed free.

Marketing.—Dig the roots in the spring or autumn of the second year. They should be thick and spindle shaped. An acre of ground may yield a ton of dry root, and this should fetch a price of about 7d. per lb. The crop requires to undergo a careful process of washing, slicing, and drying. Elecampane is used in liqueur distilleries and is largely grown on the Continent for medicinal purposes as well as those of the confectionery trade.

Erigeron (*Erigeron canadensis*. Syn. Canadian Fleabane. Nat. Ord. Compositæ), *B.P.C. & H.*—This is useful as a tonic, diuretic, and astringent. See also article on *Erigeron*.

Description. — An erect, tall branched plant with yellowish heads and purplish-white ray florets.

Cultivation.—Plant in November or March in any good soil in sunny spot.

Marketing.—The whole herb is required. This should be dried when coming into blossom. There is a demand for this variety of Fleabane, but a very slight one for the Common Fleabane (*Pulicaria dysenterica*), often supplied in mistake.

Eyebright (*Euphrasia officinalis*. Nat. Ord. Scrophulariaceæ).

Description.—A charming little heath or downside plant a few inches in height supposed to be partially parasitic on the roots of grasses. It is worth the collector's attention.

Marketing.—The whole herb, for which there is a steady demand, is picked when in flower and dried.

Fennel (*Foeniculum dulce*. Nat. Ord. Umbelliferæ), *B.P. & H.*—This is used as an aromatic and carminative.

Description.—A very well-known tall feathery herb with wide-spread umbels of tiny yellow flowers.

Cultivation.—Fennel likes plenty of sun, and will succeed on land dry and stony enough to be suited to little else, but does best on a rich, stiffish soil, well prepared according to ordinary horticultural methods. It requires a warm genial situation. From 4½ to 5 lb. of seed are needed per acre. It should be sown in the spring in drills 3 ft. apart. See also notes on the umbelliferous crops generally under CARAWAY, DILL, and CORIANDER.

MARKETING.—A crop should be obtained averaging 15 cwt. per acre. The crop is cut or scythed down before the fruits are fully ripe. The "seed" is graded according to size and should not be "dirty," *i.e.* brown, or weather and soil stained. This detracts entirely from its value. Collectors of the wild herb should bear this point in mind.

Fern (Male) (*Dryopteris Filix-mas.* Nat. Ord. Filices), *B.P. & H.* — A drug used as an anthelmintic, and an important pharmacopœial plant.

CULTIVATION.—Would-be growers of Male Fern must be careful in transplanting specimens from the wild, or in collecting spores for sowing, to identify the correct fern, since this species may easily be mistaken by the amateur among others which bear a general likeness to it. The kidney shape of the spore case, and the number of points in any transverse section of "root" or leaf base, are the determining features, but if any doubt is felt on this head the only safe plan would be to obtain stock for propagating from some reliable firm.

The plant is quite common in this country, and grows freely in moist, sheltered situations. It would be worth the while of those who have a stretch of woodland, on some portion perhaps of an estate or fair-sized farm, to encourage a plantation there of Male Fern. The spores should be sown in autumn in damp, shady spots, preferably on the banks of streams. The sowings should be left untouched for a few years to mature and increase, and later there would be a steady market for the yield. It is not, indeed, a fern which first springs from the spore; several years must pass before "rhizome" of sufficient size can be dug from the young plants, and the better grown and more established these are, the finer the product.

MARKETING.—The "rhizome," or root, a brown scaly mass covered with a tangle of chaff, leaf stalks, and fibres, is dug in late autumn, divested of all this dead or extraneous matter, and carefully dried. Harvesters of Male Fern root should make inquiries as to the current prices and market for that season, as the drug deteriorates in storage and should not be used after a year.

Feverfew (*Chrysanthemum Parthenium* or *Matricaria Parthenium.* Nat. Ord. Compositæ).

DESCRIPTION.—A well-known wild perennial, with yellow centres to its white petalled flowers.

MARKETING.—Dry the leaves according to the usual directions for herbaceous material.

Flax (*Linum usitatissimum.* Nat. Ord. Linaceæ).—This is the source of linseed.

DESCRIPTION. — The blue-flowered flax. A crop (if grown on commercial scale) for the farmer, as it requires considerable acreage.

PURGING FLAX (*Linum Catharticum*).—This has a white blossom. Both these plants are grown either for seed *or* fibre, but they cannot profitably yield the two products.

Fleabane.—See ERIGERON above.

Foxglove[1] (*Digitalis purpurea.* Nat. Ord. Scrophulariaceæ) *B.P. & H.*—This herb is used for making a powerful cardiac tonic; also as a diuretic; and is the source of an important alkaloid. It is one of the principal pharmacopœial plants.

COLLECTION.—In 1914, and during the early days of the Great War, the public were advised to grow Foxglove by way of combating the anticipated shortage of the imported drug. But Mr. E. M. Holmes soon pointed out that the plant grew wild in such quantity all over England where the soil happened to suit it, that if only proper facilities for its collection and drying could be arranged, there would be no occasion to cultivate the herb, but rather indeed to organise for making it one of our national exports! The Herb Growing Associations no longer require their members to grow Foxglove, but only to collect the leaf in the proper season, *i.e.* just before the blossoming spike comes to perfection. It may be as well to point out that the species *Digitalis purpurea*—the well-known "purple" foxglove—often exhibits white to yellow blossom. The leaves from these should be gathered, as they are identical with those from the purple-flowered specimens. The flowers of none are required.

---

[1] For details of garden culture and species not named here reference to our separate article on FOXGLOVE should be made.—EDITOR.

CULTIVATION.—Foxglove is often grown in gardens for the sake of its showy blooms. It requires a well-drained loose soil, rich in leaf-mould, on silicious or slaty ground; and a moderate amount only of sun, preferring, indeed, shady spots in the woodland. It can be raised from seed. The plant is biennial and sends up only a rosette of leaves the first year; it will thus spread and propagate itself.

MARKETING.—Great care should be exercised in gathering and drying the leaves, all those in any way defective, spotted, or eaten, being rejected. The product should retain a good colour or it will be unsaleable. Dry the leaves quickly, soon after picking, in shade, a few at a time; not altogether in a moist or unmanageable heap. The price for the dried leaf varies according to quality of sample from 4d. to 1s. 4d. per lb., or 10s. 6d. per cwt.

Garlic.—See separate article, also under SHALLOT in present article.

Gentian[1] (*Gentiana lutea.* Nat. Ord. Gentianaceæ), *B.P.*—The root is used as an infusion (bitter tonic), and extract as basis for pill massing.

DESCRIPTION AND CULTIVATION.—The Gentian used in medicine is not generally grown in this country, and it is to be doubted whether an attempt to do so would meet with commercial success. The more familiar *Gentiana acaulis* of the rock garden is not the required species. *Gentiana lutea* has large ovate parallel-ribbed leaves much like those of the genus *VERATRUM*, on which we devote a separate article. These plants require moisture and good drainage; they do well in rock-work and in shady borders. (*Gentiana purpurea*, *G. pannonica*, and *G. punctata* are sometimes seen in commerce.)

MARKETING. — The rhizomes and roots are collected in the autumn and dried fairly quickly so as to avoid fermentation. Slow drying, however, secures a better colour.

German Chamomile. — See under CHAMOMILE.

Heartsease.—See under VIOLET.

Hemlock (*Conium maculatum.* Nat. Ord. Umbelliferæ), *B.P.C. & H.*—An intensely poisonous herb (see precautions to be taken under ACONITE), and the source of an important alkaloid. A cardiac remedy.

DESCRIPTION.—Hemlock grows wild all over England. It is a tall branching biennial plant found in hedgerows, with leaves much like those of the familiar hedge Parsley, and umbels of crowded but inconspicuous greenish-white flowers. The harvest is taken when the plant is in both fruit and flower during its second season. In cool, sheltered situations Hemlock may attain twice the height to which it grows in the sun or merely by the roadside. It can be very easily recognised and distinguished from the host of other umbelliferous "weeds" so much like it—superficially—by two signs, the distinct dark purple blotching all up and down its stout, hairless, furrowed stem, and the strong mousy, fœtid smell of its crushed leaves.

CULTIVATION AND MARKETING.—Hemlock can be grown from seed sown in shallow drills 3 ft. apart in the spring. The seedling plants, which only form small dense bushes of leaves the first year, require thinning to about 13 ins. apart. They need a good deal of watering in dry weather or on light soil. In the second year the leaves are stripped when the herb has shot up to about 4 ft. in height, and is just coming into blossom. Like the yields of all other herbaceous plants Hemlock should be consigned to the buyer without delay, or dried immediately. The seed is collected before it ripens on the plant, and allowed to mature afterwards. The entire flower-heads or "umbels" are picked, and the "seed" (more correctly the fruit) is thrashed out when these are ripe and dry.

Henbane (*Hyoscyamus niger.* Nat. Ord. Solanaceæ), *B.P. & H.*—This highly poisonous plant is used as a narcotic, anodyne, and sedative. It is the source of valuable alkaloids.

DESCRIPTION.—Henbane occurs in two varieties, annual and biennial. The former is required in far less quantity than the latter and is seldom cultivated intentionally. The leaves, flowering tops of branches, and the seeds all command a fairly steady and satisfactory price in the drug market. The plant is found growing wild in waste places, on rubbish heaps, and in sandy localities near the sea, but it is not particularly common. It is an unattractive but very unmistakable herb, with large viscid downy leaves, drooping in pairs along the coarse branching stems, funnel-shaped drab-coloured flowers with purple veins and a dark centre, succeeded by capsular hairy fruits. The whole herb has a rank narcotic smell.

---

[1] For rock garden culture and other species our article on GENTIANA should be consulted.—EDITOR

CULTIVATION.—Henbane culture is not a matter for the amateur. The plant is one of the most erratic, unreliable, but remunerative crops upon which the would-be herb specialist might embark. [All the expert literature or advice to be obtained on Henbane Culture should be consulted, and rather than take up the quantity of space necessary to do justice to the plant we prefer to advise readers to consult Miss Teetgen's *Profitable Herb Growing and Collecting* (Country Life Ltd.) or other similar works.—EDITOR.]

MARKETING.—The leaves are the part chiefly required. The best are obtained from plants in their second year. The flowering tops are also in demand, as also are the autumnal leaves of first year plants. The crop should be despatched at once, as it will not keep.

Hollyhock (*Althaea rosea.* Nat. Ord. Malvaceæ), *S.* — A herb used as a demulcent and colouring agent. See separate article for details on growing gardening Hollyhocks in their numerous varieties.

CULTIVATION AND MARKETING. — Hollyhock is too well known to need description. The plant is grown in materia medica gardens for the sake of its deep red blossoms. These should be picked from the spike as they severally come to perfection in August, freed from the calyx, and carefully dried so as to retain a good colour. The garden Hollyhock is not a native wild British plant. It is a perennial Mediterranean species, and is grown from seed sown in deep rich soil, in the open, from November to March. It flowers from July to October, the single forms being more easily cultivated than doubles. As the plants may attain a great height they require careful staking. They are subject to an apparently incurable disease which destroys the leaves, and will succumb to damp and ungenial surroundings. The only remedy is to make fresh sowings.

Holy Thistle (*Carduus benedictus.* Syns. BLESSED THISTLE, MILK THISTLE, MARY'S THISTLE. Nat. Ord. Compositæ), *H.*—A herb used as a tonic, stimulant, diaphoretic, and emetic.

DESCRIPTION AND CULTIVATION.—Blessed Thistle is a biennial but not a native British plant, though it can be grown successfully in this country in a warm and genial situation. The richer the soil, and the better prepared, the larger the yield of herb. It can be raised from seed sown very thinly as early in the spring as possible up to the middle of June; this requires to be lightly covered with soil. The seedlings must be thinned out to about 18 ins. apart, and kept clear of weeds Seed should only be obtained through a thoroughly reliable channel, or the plants will not be true to medicinal strain.

MARKETING.—The crop is harvested as soon as the blossom begins to appear. The average yield per acre should be from 3 to 5 tons, and the average price per cwt. is about 38s.

Horse Mint.—See AMERICAN ORSE MINT in article on *POTHERBS.*

Horseradish (*Cochlearia Armoracia.* Nat. Ord. Cruciferæ), *B.P. & H.*—A herb used as a diuretic, stimulant, and sialagogue. See also article on *HORSERADISH.*

DESCRIPTION.—A familiar kitchen garden plant which grows like a weed when once established.

CULTIVATION.—All it requires is a deep poorish soil. Propagation is from crowns set in a well-manured trench about 18 ins. deep.

MARKETING.—The root, dug from two-year-old plants, is required, and it must be well dried. *Carefully distinguish it from Aconite root.*

Hyssop.—See article on *POTHERBS.*

Juniper (*Juniperus communis.* Nat. Ord. Auracariaceæ), *H.*—Juniper oil is extracted from the Juniper berry, and this is used as a diuretic, aromatic, and stimulant. It is a fruit for the "Collector" rather than the herb-grower.

Lavender.—See article on *POTHERBS.*

Lily of the Valley[1] (*Convallaria majalis.* Nat. Ord. Liliaceæ), *H.*—A plant used as a cardiac remedy.

DESCRIPTION AND CULTIVATION.—A well-known perennial plant with a creeping rhizome root, found in the wild state growing in cool places on rich but light soil. It is, however, much cultivated in gardens, and ground is always devoted to it in herb plantations.

---

[1] The garden culture of this plant is described in a separate article entitled *LILY OF THE VALLEY.*—EDITOR.

Lily of the Valley is grown from "crowns" (to be obtained either from wild specimens in the autumn, or through any reputable firm of florists and seedsmen). These are set 6 ins. apart in rich soil and a shady position, but not under trees, from October to November. They will require replanting after five or six years, but in the meantime if not allowed to overcrowd each other, the plants will have yielded plenty of flower scapes, since they blossom all through May and June. See also directions for Violet and Heartsease Culture.

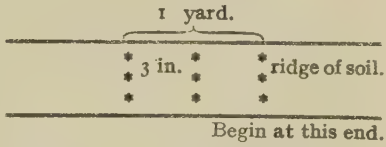
Marketing.—The part required in commerce is the entire flowering stem. The flowers are dried on the stem, and should retain as much of their whiteness as possible. It commands a good price, averaging about 5s. 6d. per lb. in a dry state.

Linseed.—See under Flax.

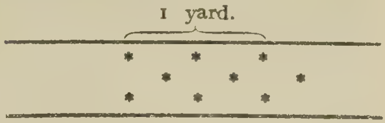
Liquorice (*Glycyrrhiza glabra*. Nat. Ord. Leguminosæ), *B.P. & H.*—This is used as a laxative, and flavouring agent.

Description.—Liquorice leaves are compound in character. Its flowers are mauve and similar to pea flowers, though smaller. They drop so quickly —especially in wet seasons—or appear so late, and are so inconspicuous that they often escape the attention even of those familiar with a liquorice field. Pods are rarely formed and never contain more than one or two seeds. The roots range from 2 ft. to 10 ft. in length.

Cultivation.—Liquorice is not a native British plant, nor—like the majority of the plants we are considering—is it a wild herb. It is, however, an herbaceous perennial, the chief difficulty in its cultivation being the great length of its root. This last is the part required in commerce, and it requires to be dug up without breaking or injury. Liquorice can be grown quite easily in this country: it is propagated by the division of the 4-year-old roots, and not from seed. The plant requires no less a depth of rich loam than 2½ ft., preferably resting on a well-drained subsoil of marl. The ground upon which it is proposed to grow liquorice should be divided into four equal portions, and so planted that every year the liquorice upon one or another of these comes to maturity and is lifted. It is prepared by careful trenching and manuring, and previous to the setting of the "buds" should be in a fine condition of tilth. These "buds," called respectively "crown buds" and "runner buds" from the portions of the root from which they are derived, are planted in the soil in threes at the rate of nine to the yard, and are set about 3 ins. apart. The soil itself is previously cast into ridges endways to the sun, the ridge (or "grip") and trench (or "liquorice valley") together measuring a yard across. Each "bud" consists of about 6 ins. of root, and is set half in and half out of the soil by means of a steel-shod dibber, and is then well and firmly earthed down. The arrangement of "buds," originally thus:



is altered when the row is complete, by the resetting of the centre "bud" thus:



"Runner buds" and "crown buds" can be used together with judicious arrangement and alternation in setting, in the proportion of half and half, or one-third of the former to two-thirds of the latter. Catch crops of ordinary vegetables can be grown in the trenches between the rows of liquorice for the first two years, but after that time the practice cannot be continued as the plants then become too tall and bushy and monopolise the space.

Every year the foliage of the liquorice plant dies down, and the withered stalks should presently be cut away as close to the ground as possible without injury to the dormant buds.

Marketing.—When, however, the plants on any given section of the plot reach the age of four years, the roots are ready for harvesting. First the foliage (*only of that particular plot, and only sufficient for each day's lifting operations*) is mown down, the trenches opened as deeply as may be found necessary, after which the roots are carefully taken out. These are then "horned," *i.e.* shorn of the remaining leaf stalk (care has to be taken to avoid excessive "bleeding"), and finally cut away from the crown and prepared for market. The subsidiary roots are not detached, but the "fibre" is stripped and sold separately from the root itself. The crowns remaining are then paired and divided for resetting to increase the stock. The plant should be discouraged from forming too many runners, as it has a tendency to do in light soil, since this causes deterioration in the quality of the root. Runners can be cut back when cleaning the ground, generally in the winter. The runners of the four-year-old plants are used for setting again as buds, new growth taking place upwards and downwards from any given growing point on a length of about 6 ins. The crown buds should not be divided up too much, it being preferable to raise a sturdy plant from one with two or three branches than a weakly one from an over-pared stock.

Cultivation of liquorice in shallow soil would probably obviate a good deal of the laborious deep digging which at present makes the crop so onerous a one to undertake. In shallow soil the root would either thicken and shorten, or turn, and run along on the top of the sub-soil, so that it could be thrown out, not by hand, but with horse labour and a scarifier. The root should be about the thickness of a fair-sized carrot: it may be 4 ft. to even 10 ft. long.

The yield of liquorice root should be about 10 tons per acre. The price of English root has greatly recovered since 1914, so this is a great inducement to cultivate it.

Male Fern.—See FERN (MALE).

Mallow (*Althaea officinalis.* Nat. Ord. Malvaceæ), *B.P.C. & H.*—This is used as an emollient and demulcent. It is similar to HOLLYHOCK (*q.v.*), and may be grown and marketed in the same manner.

MARSH MALLOW (*Malva sylvestris*, Nat. Ord. Malvaceæ) must be distinguished from the common Mallow by the nature of the places where it grows, its larger "habit" generally, and its beautiful mauve-pink blossoms. It is found in dykes, ditches, damp meadows, salt marshes, and near the sea, but is of very local occurrence. It flowers from August to September, and is a perennial.

CULTIVATION.—The golden rule in this and all other wild-herb cultivation is to imitate as far as possible the natural conditions under which the plant is found. The roots are thick, long, and tapering. They bend easily, are whitish-yellow outside, white and fibrous within, and abound in mucilaginous juice. It is these roots which are chiefly required in medicine. The herb can be raised from seed sown in spring, and also from cuttings. Offsets from the roots carefully divided in autumn when the annual growth has died down, will grow of their own accord. They should be planted about 2 ft. apart, and could well be cultivated on waste or unused ground in any damp locality. They should be dug in autumn from plants not less than two years old, and dried, decorticated, and otherwise prepared for market according to the usual methods. Marsh Mallow leaves should be picked and dried in August; the flowers with the calyx attached being gathered when just expanding, and so dried—in a current of dry air—out of the sun, as to preserve the colour as much as possible.

Marigold (*Calendula officinalis.* Nat. Ord. Compositæ), *H.*—This is used as an antispasmodic, deobstruent, and diaphoretic.

CULTIVATION.—Marigold is grown from seed, and will succeed on a light sandy soil or a rich garden loam. It does well on a variety of soils. If sown at the end of August or in early September it flowers earlier than if held over to the early spring. It should be sown in drills 18 ins. apart, in an open situation, and the seedlings thinned to stand 2 ft. apart. The herb is an annual, but will re-seed itself, come up year after year, and spread profusely.

MARKETIN .—The parts required are the yellow ray florets of the blossoming head. These should be picked throughout the entire flowering season, and must be very carefully dried to retain a good bright colour. Mr. Holmes considers that "the commercial article might be much improved by growing a deep coloured variety, such as *Prince of Orange.*" The petals fetch about 1s. 6d. per lb. dried, and, although it will be obvious how great a mass of florets will be requisite to produce this weight of dry product, when it is remembered how easy Marigold is to grow, how profusely it blossoms, and how long the season lasts, the collection would probably be worth while, especially considering the demand is not a problematical one, but quite constant.

Marjoram.—See article on *POTHERBS*.

Meadow Saffron.—See under CROCUS, SAFFRON.

Melilot (*Melilotus officinalis.* Nat. Ord. Leguminosæ).

DESCRIPTION.—This forms a dainty feathery bush bearing white or yellow racemes of minute papilionaceous blossoms. It grows wild in waste places, but is not common, and thus it should be protected from extermination by indiscriminating collectors.

MARKETING.—The flowering branches gathered in July or August are required, but all woody portions should be rejected.

Mint.—See article on *POTHERBS*.

Mountain Flax.—See under FLAX.

Mugwort (*Artemisia vulgaris.* Nat. Ord. Compositæ), *H.*—This is used as a diaphoretic, emmenagogue, and nervine.

DESCRIPTION.—Mugwort and Wormwood (see WORMWOOD) are wild plants, related to Southernwood (see under SOUTHERNWOOD) and TARRAGON (see under *POTHERBS*).

CULTIVATION AND MARKETING.—The culture for all is along similar lines, and very simple. The plants are easily propagated from cuttings inserted in dry, sunny, open situations. The parts required are the "tops" or slender young branches.

Mullein[1] (*Verbascum Thapsus.* Syns. BLANKET HERB and GREAT MULLEIN. Nat. Ord. Scrophulariaceæ), *H.*—This is of value as an astringent, demulcent, emollient, and gentle anodyne.

DESCRIPTION.—A tall handsome biennial plant with leaves of a thick woolly texture somewhat like those of Foxglove, and a single spike of close-packed yellow flowers which open one after another.

CULTIVATION.—Mullein is grown from seed sown in well-drained loose soil, rich in vegetable humus. It requires a fairly sunny situation but a moderate amount of shade. Seedlings will bear transplanting especially in damp weather, so that a reserve of these can be raised to fill up gaps in the field. During the first year the plant produces only a dense rosette of leaves, but in the second year their flowering spikes and tall herbaceous stems may attain a height of 7 ft. They are fairly easy to raise, but the leaves are subject to disease.

MARKETING.—Mullein is found in fair quantity, but would benefit from cultivation and study. There are six British species of Mullein, the one required in medicine being GREAT MULLEIN (*Verbascum Thapsus*), which bears a single tall spike of yellow blossoms opening one after another.

These flowers should be picked from the spike as they appear, freed from the calyx, and so dried as to avoid the process of fermentation which turns them brown and ruins them for the market. The woolly, blankety leaves are also gathered just as the plant flowers, and the roots are dug in the autumn of the second year.

Mustard (*Brassica alba* and *B. nigra.* Nat. Ord. Cruciferæ), *B.P. & H.*—This is used as a source of a powerful vesicating oil.

CULTIVATION.—This should be carried out on a farming scale where possible. Sow the seed in drills from the middle of March to the end of August. The drills should be 12–15 ins. apart, and the seedlings should be thinned out to about 6 ins. They require careful weeding.

MARKETING.—The seed is required, and to obtain it the crop must be cut when the seed is nearly ripe and well thrashed.

Onion.—See note under SHALLOT, and also article on *ONION* farther on in this book.

Opium Poppy (*Papaver somniferum.* Nat. Ord. Papaveraceæ), *B.P. & H.*—This is a source of opium and of many important alkaloids. The preparations from it are anodyne and narcotic.

CULTIVATION.—This is an annual plant, the white variety of which is required. It does well in a somewhat stiff soil in a sunny situation where moisture is not lacking. The crop is an uncertain one from a cultural point of view, but sure of a certain and remunerative market if it can be harvested in fair condition and quantity. [The instructions in the Board of Agriculture Leaflet, No. 288, should be carefully followed in growing this plant. We have no space to quote them here.]

MARKETING.—The capsules or seed-vessels should be gathered in September and carefully dried. They are sold by the thousand, and the price paid varies with the size of the capsules.

Orris Root (*Iris.* Nat. Ord. Iridaceæ). —Orris is a drug derived from the rhizomes of various species of Iris grown abroad. It is not recommended to the would-be English cultivator.

---

[1] For Garden Culture and Species our article on *MULLEIN* should be consulted.—EDITOR.

Parsley.—See separate article.

Parsley Piert (*Alchemilla arvensis*. Syn. PARSLEY BREAKSTONE. Nat. Ord. Rosaceæ), *H.*—This is used as a diuretic and refrigerant. It is said to be of great efficiency in stone.

DESCRIPTION.—An insignificant little "weed" of ploughed lands, closely allied to the somewhat better known Lady's Mantle. It appears in grey-green roundish and spreading tufts, and bears very inconspicuous green flowers in the axils of the leaves. The herb is described as common by botanical writers, but it seems to be often conspicuous by its absence even in likely places. It is in steady demand, and might therefore repay, not perhaps for cultivation, but for encouragement in waste and fallow places by those who have the overseeing of farms.

MARKETING. — Shake clear from earth, cut away the root, and dry in shade.

Pasque Flower (*Anemone Pulsatilla*. Syn. ANEMONE. Nat. Ord. Ranunculaceæ).—This is prescribed in cases of heartburn, waterbrash, biliousness, etc.

DESCRIPTION.—The Pasque Flower —a beautiful plant bearing violet blossom rather like a very large anemone—grows wild in this country in high-lying pasturages, but it is very uncommon. It could be cultivated for commercial purposes on a limited scale.

CULTIVATION.—Seeds should be sown as soon as they are ripe. They require to be thoroughly separated by well mixing with sand or dry soil or their long feathery awns prevent satisfactory sowing. They may be sown outside from April to August in a lightly shaded seed-bed very lightly covered with soil, made firm, watered lightly, and kept quite shaded from the sun until the seedlings appear. The entire herb is required and should be cut when just coming into flower. It should not be largely grown unless definite orders can be obtained. The plant is perennial and is mentioned under rock garden species in our article on *ANEMONE*.

Poppy.—See under OPIUM POPPY.

Prunella (*Prunella vulgaris*. Syn. SELF-HEAL. Nat. Ord. Labiatæ), *S.*—This herb is used as an astringent.

DESCRIPTION.—A ubiquitous little herb a few inches high occurring everywhere in meadows. It has an elongated head of whorled purplish corollas of the typical labiate type; but unlike some of the plants of this group. Prunella, when once recognised, can never be confused with others of the same order. It falls within the province of the collector, not of the grower.

MARKETING. — The whole herb, carefully dried, is required and has enjoyed a good reputation in the "natural" system of medicine, and is still in good demand among herbalists.

Raspberry.—See article on *BUSH FRUITS*. The young leaves from new canes containing a high percentage of tannin are required in herbal medicine.

Rose, French (*Rosa gallica*. Nat. Ord. Rosaceæ).—It is not proposed to enter any notes on rose culture here, since this is dealt with as a horticultural subject by an expert in separate articles. We may remark, however, that the petals of any deep crimson varieties of roses have a value in the drug market, those of the French rose being officinal in the B.P. The rules for the drying of rose petals are similar to those for all blossoms. The petals should be pinched from the flower at the moment when the bud is about to expand—in a fragrant, crumpled, conical mass—and should by no means be taken merely when the blossom is "over" and fallen. They require careful drying in shade, in natural heat, and should be repeatedly turned over to prevent them sticking or fermenting. They should not, for medicinal purposes, be made into pot-pourri. The demand for rose petals may be a fairly constant one, but it is not large.

Rosemary. — See article on *POTHERBS*.

Rue.—See article on *POTHERBS*.

Saffron.—See CROCUS, SAFFRON.

Sage.—See article on *POTHERBS*.

Sanicle (*Sanicula europaea*. Nat. Ord. Umbelliferæ).—This is useful for many herbalist purposes, and is often used as a vulnerary.

DESCRIPTION.—Sanicle is one of the most charming of the smaller herbs. It is a slender, dainty plant found in shady woods with small heads of white blossom like little stray tufts of cotton-wool. The name indicates in what medicinal repute Sanicle used to be held by the old herbalists.

CULTIVATION.—It should be protected and encouraged to spread in the wild state where found, but is hardly worthy of garden culture.

Marketing.—Gather the whole herb in August and dry carefully.

Savory.—See article on *Potherbs.*

Shallot.—See separate article. It may, however, be remarked here that the juice of garlic, onion, shallot, and allied plants has greatly come into estimation of late years—especially on the Continent, where the peculiar scent of it is not resented—as an antiseptic lotion and irrigant for wounds.

Skullcap (*Scutellaria galericulata.* Nat. Ord. Labiatæ).—This is used as a nervine in epilepsy.

Description.—The Common and Lesser Skullcaps are both English "weeds" with characteristic labiate flowers, which have some value in herbalist practice, and are sought by herb gatherers, possessing the same properties as *S. lateriflora*, an American species, although in a lesser degree. English horticultural firms will supply stocks of two or three species of Scutellaria. They are hardy plants suitable for growth about a rockery. The above named is highly esteemed by medical men who have tested its use, and is not unlikely to gain further recognition. Its culture is on the same lines as that of the labiate potherbs.

Southernwood (*Artemisia Abrotanum.* Nat. Ord. Compositæ).—This is used as an infusion and stimulant.

Cultivation.—See also under Tarragon in article on *Potherbs.* Southernwood is readily propagated by cuttings and will thrive in any free, light soil. It is a grey-green scented bushy perennial plant of which the "tops" are required.

Sunflower (*Helianthus annuus.* Nat. Ord. Compositæ), *H.*—This is grown for seed and oil.

Description.—An annual variety of Sunflower forming very large heads with enormous seed disks.

Cultivation.—It is grown from seed, set thinly in boxes under glass in March. Any ordinary soil or compost similar to that used for cucumbers or marrows will suit the Sunflower. The seedlings are planted out early in May, after the danger of frost is over, and should be set 2 ft. apart in rows 3 ft. asunder. The soil should have been previously well dug and manured, applying dung at the rate of about 3 cwt. of ordinary farmyard manure per rod, and giving an application of 1½ oz. of superphosphate of lime per square yard before or at the time of planting. This will encourage the seed to mature early. Staking will be required especially in exposed and sunny positions, when they form very heavy heads of blossom. Seed is required at the rate of 1 oz. to 8 rods, care being taken to obtain that of the annual Sunflower only.

Marketing.—The seed should be allowed to mature on the plant if possible, but (*a*) if the weather is unfavourable, (*b*) if the heads are much exposed to the depredations of birds, and (*c*) if the seeds are liable to be much shaken out, the flowers should be cut in late autumn when the seeds are nearing maturity, and dried on the shelves or the floor of any dry, warm building.

Sweet Basil.—See under Basil in article on *Potherbs.*

Sweet Marjoram.—See article on *Potherbs.*

Sweet Sedge (*Acorus Calamus.* Nat. Ord. Araceæ).—This drug is aromatic and carminative.

Description.—An aquatic plant, to be carefully distinguished by the wavy edges of its sword-like leaves, and from their sweet scent when crushed, from plants of the Iris family.

Cultivation and Marketing.—The plant is easily propagated in very damp soil or on edges of streams by division of roots. The crowns are set in the same way as Horseradish and Liquorice, and the roots are harvested twelve months later by digging or turning out with the plough.

Sweet Violet.—See under Violet in this article.

Sweet Woodruff.—See under Woodruff in this article.

Tansy (*Tanacetum vulgare.* Nat. Ord. Compositæ), *S.*—This is used as a bitter tonic, emmenagogue, and diaphoretic.

Description.—This is one of the last wild flowers of the season. It is an upright, somewhat ragged plant found very generally all over the country, with much-cut leaves, and clusters of small rusty-brown coloured heads. Tansy need not be cultivated so much as preserved and encouraged in the localities where it is found. It used to be esteemed as a tea, and there is still sufficient herbal demand for the plant (although this fluctuates) for the collector's attention to be directed to it. The whole herb is cut in August and dried in the usual way.

Tarragon.—See article on *POTHERBS.*

Thistle.—See under HOLY THISTLE in this article.

Thorn Apple (*Datura Stramonium* and *D. tatula.* Nat. Ord. Solanaceæ), *B.P. & H.*—An important pharmacopœial plant, and source of alkaloids. It is used as a narcotic and antispasmodic.

DESCRIPTION.—Thorn Apple is a stout branching annual with long entire leaves and long white tubular flowers. It is somewhat rarely found in the wild state, but can be easily grown from seed. It thrives best in sunny open situations and in rich and rather heavy soils freely supplied with lime.

CULTIVATION.—Seed may be sown in the open early in the spring in drills 3 ft. apart, and the seedlings, which soon appear, require to be thinned out to at least 15–24 ins. apart, to allow for the spreading bushy growth which rapidly takes place. The plants will stand transplanting, so that a reserve might be kept to fill in gaps and failures here and there. As the flower-buds appear they should be pinched off to encourage a luxuriant crop of leaves, and even if the plant is chiefly being grown for seed it will be advisable to check the development of many capsules in order to obtain a few of first-rate size full of strong seed.

Thorn Apple is peculiarly subject to a certain insect pest which eats out the green substance of its stout somewhat fleshy leaves, leaving tracks of nothing but the transparent skin.

These small green grubs are to be found snugly nestling among the prominent branching of the veins on the underside of the leaves, and they appear very early in the plant's career. Probably the use of a good insectide spray [1]—unless it proved harmful to the herb itself—would do something to help matters at an early stage, but the writer has found the laborious method of cleansing the leaves by hand quite the most satisfactory. Once the plant is well ridded of the pest it seems not to be readily attacked again, probably because the time is then past when the leaves are succulent enough for the grub, or when the grub is no longer in that particular stage of its development to require them.

MARKETING.—The leaves are gathered when the plant is in full bloom. They can be picked by hand, or the entire crop may be mown down. Hand picking preserves the flowers and fruit, and the seed can be the more readily shaken from the dry gaping capsules when ripe for this thinning of the foliage. Yields of *dry* leaf at the rate of 1000 to 1500 lb. per acre may be obtained (*i.e.* five times that weight of fresh leaf is actually harvested).

If grown for seed the capsules should be harvested just before they are ripe, and allowed to dry, and open, and shed their masses of black reticulated seed on sheets of newspaper spread in the sun. Otherwise there is some danger of these capsules becoming mouldy on the plant. Growers must bear in mind that this plant is highly poisonous. See precautions under ACONITE in this article.

Valerian [2] (*Valeriana officinalis.* Syn. GREAT WILD VALERIAN. Nat. Ord. Valerianaceæ), *B.P. & H.*—An important pharmacopœial plant, well worth the grower's attention, which is used as a nervine, stimulant, antispasmodic, and tonic.

It must be carefully distinguished from the Red Valerian of the flower garden (*Centranthus ruber*), and from the various other species of wild Valerian and Centranthus.

DESCRIPTION.—A stout tallish plant with pinnate leaves consisting of numerous leaflets, and white or pinkish flowers, in a terminal rounded "cyme." It is a perennial, flowering from June to July, and is found in damp neglected spots, though it is not particularly common.

CULTIVATION.—Valerian may be grown from seed, or from the runners given off by older plants. The ground should previously be well dug and treated with farmyard manure. It must be fairly retentive of moisture, and be in a damp, shady locality or situated on the bank of a stream. The seed—to be obtained in autumn from fine wild specimens, or through seedsmen who understand the strain required—can be sown in the open from April to August. Seedlings must be pricked off and set in permanent quarters as soon as they attain a fair size. They need careful weeding, and must have abundance of liquid manure, and water. Plants grown from seed may not flower the first year, but will produce plenty of leaves. If blossom should appear it should be cut off to encourage the formation of good root or rhizome. The underground stems of Valerian give off slender runners from which new plants originate. The usual method of propagation is to transplant wild specimens, or to collect these daughter plants, setting them in prepared ground at a suitable distance apart, and treating them in the same way as seedlings.

---

[1] Spray preferably with a strong soap and quassia infusion, followed by a drenching with pure water. Or one of the nicotine fluids or other leaf-eating-caterpillar destroyers advertised in reliable horticultural journals may be tried. In the case of medicinal herbs grown for their leafage, poisonous drenches (of arsenic or lead) must be avoided.

[2] For Garden Culture and Species see article on *VALERIANA.*—EDITOR.

Marketing.—In September and October the plants are scythed down and the rhizomes are dug or ploughed out. These are then placed in troughs or boxes drilled with holes in a stream of running water, and well stirred, until thoroughly washed. They are next sliced and dried in artificial heat. The smaller rhizomes need not be sliced. The B.P. thus describes the commercial article as it should appear on the market after this process: "A short erect rhizome entire or sliced, dark yellowish-brown externally, and giving off numerous slender brittle roots 3–4 ins. long, of the same colour as the rhizome: rhizome and roots whitish or yellowish internally. The odour that is developed in the process of drying is strong, characteristic, and disagreeable; taste unpleasant, camphoraceous, and slightly bitter." Growers of Valerian would be well advised to undertake the process of curing on the spot, since they are then less dependent on an immediate market for sale, and the outfit required—washers, shed, coke stove, slicers, etc.—could be utilised for other herbal roots, such as aconite, belladonna, burdock, dandelion, dock, etc.

Violet (*Viola odorata*) and **Heartsease** (*Viola tricolor*. Nat. Ord. Violaceæ), *H.*—These herbs, the former a cultivated, sweet-scented species often found wild, but largely grown in gardens, and the latter found as a cornfield "weed," are both officinal in Homeopathy. The various violets and pansies used in perfumery and confectionery as well as in medicine are cultivated on a commercial scale at Stratford-on-Avon. The flower of the sweet-scented Violet is required as well as the leaves. It should be picked before it is in full bloom, and rapidly dried to retain as much colour as possible after being deprived of the calyx. The entire herb, Heartsease, is marketed.

Cultivation.—The violets are perennial herbs found very generally all over the country. They can be grown from seed or by transplanting *en masse* to suitable situations, where they spread, bloom, and multiply year after year, requiring little attention at the hands of the grower. The soil should be well prepared by digging in the first place, and mixed with fibrous loam, road grit, and farmyard manure. The position of the beds should be neither too sunny nor too shady. The young plants should be soaked in water during times of drought, when the sun is not too hot, and the herbs should generally be mulched when flowering with leaf-mould, moss litter, etc. The beds should be made afresh every few years.

Wintergreen (*Gaultheria procumbens*. Nat. Ord. Ericaceæ), *B.P. & H.*—This is the source of Oil of Gaultheria, used as an antirheumatic and anodyne. An important pharmacopœial plant.

Description.—This is a little procumbent ground-covering herb, with dark green leathery leaves, and bright red berries, allied to the Bearberry. Wintergreen is a source of a drug officinal in British medicine as well as in Homeopathy, which always commands a high price, so that the market for the herb is an assured and steady one. It is an herbaceous perennial plant with woody leaf-stems, not a native of this country, but an American plant, and must be distinguished from the five species of Pyrola or Wintergreen which grow wild in England.

Cultivation.—Wintergreen should be propagated from specimens found growing wild in their natural situation. Seeds expressed from the berries when ripe in the autumn will germinate if sown in suitable spots, *i.e.* in a grove, or under shade, or even under clumps of bushes, unless these trail upon the ground and completely exclude the light and air; but sets from the entire herb root easily and spread. Divided roots may be planted in woodland spots in the spring or autumn, about 6 ins. apart each way, in permanent beds. They will soon cover the entire ground. The soil requires a natural or artificial mixing to the depth of 4 ins. or more with good leaf-mould or rich vegetable humus. The herb is gathered and dried in October.

Woodruff (*Asperula odorata.* Syn. SWEET WOODRUFF. Nat. Ord. Rubiaceæ).—This is useful as a diuretic and tonic.

DESCRIPTION.—This is a well-known beautiful little woodland herb, often grown in gardens. It could be marketed, if collected or gathered in sufficient quantity, without difficulty.

MARKETING.—Dry as for other herbs during the flowering season. The whole herb is required.

Wormwood (*Artemisia Absinthium.* Nat. Ord. Compositæ).—This is used as a bitter tonic and anthelmintic.

DESCRIPTION.—This is one of the plants, allied to Southernwood, Mugwort, and Tarragon, whose cultivation from seed or propagation by division of roots might advantageously be increased. The flowering "tops" are the parts required. Gather in August or throughout the blossoming season, and carefully dry.

Yarrow or **Milfoil** (*Achillea Millefolium.* Nat. Ord. Compositæ).—This is used as a diaphoretic, stimulant, and tonic.

DESCRIPTION.—A ubiquitous herb, the demand for which is such that the wild supply might be augmented by cultivation. It does well on light soil in open situations. Herb centres offer 1d. per lb. for fresh herb.—A. B. T.

MEDICINAL MANDRAKE (*Mandragora officinarum*).—See *MANDRAKE.*

MEDICINAL RHUBARB (*Rheum officinale*).—See *RHEUM.*

MEDICK.—See *MEDICAGO.*

MEDITERRANEAN CRESS. — See *MORISIA.*

MEDLARS.

These are grown as standards, and are esteemed by many. The large flat Dutch makes an umbrella-like tree, and is very pretty in blossom. *The Royal* and *Nottingham* grow upright. The latter is small but is produced in quantity. The flavour is briskly acid. *The Royal* is medium sized.

The trees are very hardy, and being worked upon the Thorn or Pear stocks, will grow anywhere. The fruit should hang on as long as possible and be stored in a cool place, where they "blet" (become soft and eatable) gradually. They make a fine jelly for game, etc., and a good jam for those who cannot eat sweet preserves. Planting is done as described in our notes on *APPLE.* They require no after care, but the fruits are larger where the boughs are kept fairly thin.—G. B.

See also *Pyrus germanica* in *TREES.*

MEGASEA.—Now included in the genus *SAXIFRAGA.*

MELANCHOLY THISTLE (*Cnicus heterophyllus*).—See *CNICUS.*

MELANDRIUM.—Now included in the genus *LYCHNIS.*

MELIC GRASS.—*MELICA.*

MELICA (MELIC GRASS. Nat. Ord. Gramineæ).—This is a genus of hardy grasses, all of which are perennials of no great garden value, but may be grown in the wild garden. *M. altissima atropurpurea* is quite the best species to grow, though *M. ciliata* (Syns. *M. cretica* and *M. glauca*) comes near it. These grasses average 3–4 ft. in height. *M. uniflora* is a very dwarf sort, the height of which only averages 6–9 ins.

MELILOT.—See *MEDICINAL HERBS* and *MELILOTUS.*

MELILOTUS (MELILOT. Nat. Ord. Leguminosæ).—This is a genus of hardy annuals, hardy biennials, hardy perennials, and hardy shrubs, none of which merit cultivation. *M. officinalis,* the MELILOT of waste land, is briefly referred to under this latter name in our article on *MEDICINAL HERBS.*

MELISSA (Nat. Ord. Labiatæ).

Only one species of this genus is grown in gardens. This, *M. officinalis,* is included in our article on *POTHERBS,* under BALM, where its culture is briefly described. Two other species, *M. alpina* and *M. grandiflora,* formerly classed in this genus, have now been transferred to the genus *Calamintha* (see article on CALAMINT), where they will be found described under *C. alpina* in the rock garden species, and *C. grandiflora* in the perennial border species.

MELITTIS (BASTARD BALM. Nat. Ord. Labiatæ).—One species of this genus, *M. Melissophyllum*, known by some people as HONEY BALM, apart from its medicinal value, is of sufficient merit to be grown in the herbaceous border, as it is a hardy perennial. It bears flesh-pink flowers in May and June, on plants 1 ft. high, and may be treated in the usual manner for hardy perennials. (See also BALM in article on *POTHERBS*.)

MELOLONTHA and MELOLONTHIDÆ. — See CHAFERS in *INSECT PESTS*.

MELON (*Cucumis Melo*. Nat. Ord. Cucurbitaceæ).—Where early melons are needed, small, sufficiently heated lean-to or span-roofed pits are the best. For summer crops span-roofed houses and frames may be utilised. Bottom heat must be furnished by hot-water pipes or by leaves and stable litter, and should be maintained as near 75° F. as possible. The minimum temperature should be 60° F. to 70° F., and the maximum 80° F. to 90° F. Up to a certain point the melon is one of the easiest fruits to grow; the critical time comes when the fruits are approaching ripeness.

Compost.—This should be a rather strong loam with a little old lime rubble and burnt earth added. The beds need not be more than 2½ × 2 ft., or the compost more than 18 ins. in width to commence with. Form this into a ridge the whole length of the bed. The plants may be set out about 18 ins. apart, and two, three, or four fruits allowed to each plant. Attention must be given to tying in the shoots and stopping of laterals. If very early fruits are required, do not stop the plants until after the fruits are set. Secure two or three fruits, and fertilise at the same time if possible. The earlier the date operations are commenced, the more artificial heat and attention are required. Sow the seeds singly in small pots and plunge in a bottom heat of 75° F. Allow about four months from sowing to ripening in early spring, and three months in the summer. They may be grown on the extension system of two or three shoots, or on single stems, which some consider the better and more profitable mode of culture. Grown on single stems in 11-inch pots is far the best method for early work; then canker, one of the greatest troubles, is almost unknown. Fertilise the flowers, and support the fruits when they attain the size of a cricket ball by nets, and stop laterals to avoid overcrowding.

Watering and Ventilation. — As light and growth increase, the plants must be liberally supplied with slightly warmed water. During the time the fruits are swelling assist the plants with weak stimulants. Little or no water will be required when the fruits are ripening, but ventilation must be increased considerably. Melons do not require much air during the growing period; top ventilation is ample, with liberal supplies of moisture in the atmosphere.

Frame Melons.—A hotbed should be made up in May, placing one mound of soil for each light, and setting two or three plants on each mound. Pinch out the points when the plants have made about 18 ins. of growth to induce the formation of other shoots. Fertilise the female flowers until three or four fruits are obtained on each plant. Keep the growths thinly trained by frequent pinching or by the removal of a few superfluous shoots, supplying the necessary moisture as recommended.

Varieties.—These are numerous; the following may be relied upon :—

Green Fleshed Sorts.—Dickson's Exquisite, Emerald Gem, and Ringleader.

Scarlet Fleshed. —Blenheim Orange, King George, and Superlative.

White Fleshed.—Eminence, Hero of Lockinge, and The Countess.

F. J.

MELON FRAMES. — See *GREENHOUSES AND FRAMES.*

MENISPERMUM.—For best species see *CLIMBING AND TRAILING PLANTS.*

MENTHA (MINT. Nat. Ord. Labiatæ).—This is a genus of hardy herbaceous and spreading perennials of the easiest culture. *M. arvensis* is the well-known CORN MINT; *M. piperita* is the PEPPERMINT used in medicine and confectionery; *M. Pulegium* is the equally well-known PENNYROYAL. (See article on *POTHERBS* for hints on culture of these two.) *M. rotundifolia* is known as APPLE MINT, and is comparatively unimportant. *M. sylvestris*, known as HORSE MINT, must be carefully distinguished from the more useful AMERICAN HORSE MINT (*Monarda punctata*), described in our article on *POTHERBS.* The most useful species of all is *M. viridis*, the GARDEN MINT or SPEAR MINT, referred to in our article on *POTHERBS* under the former name.

MENTZELIA (Syn. *Bartonia.* Natt Ord. Loasaceæ).—The beautiful little Californian annual so frequently labelled *Bartonia aurea* or *B. crocea*, is really *Mentzelia Lindleyi.* It loves the sunshine, and produces its wide, five-petalled golden blooms over a considerable period in the summer and autumn. As the individual flowers are 1½ ins. across, a group of plants in bloom gives a fine effect. It is best treated as a half-hardy annual, but does well in the southern counties if sown in a warm position in March or April. It grows 1½ ins. high.

MENYANTHES (BOG BEAN or BUCK BEAN. Nat. Ord. Gentianaceæ). — The one species of this genus, *M. trifoliata*, is a bog plant pure and simple. It is referred to in our article on *MEDICINAL HERBS*, under BUCK BEAN, and must not be confused with BUCKWHEAT, to which a reference is made in our notes on *FAGOPYRUM.*

MENZIES SPRUCE (*Picea sitchensis*). See *TREES.*

MENZIESIA.—For the best species see *SHRUBS.*

MENZIESIA POLIFOLIA.—See *Dabœcia polifolia* in *HEATHS.*

MERCURIALIS (DOG'S MERCURY. Nat. Ord. Euphorbiaceæ).—This is a genus of highly poisonous annual and perennial plants found wild in hedge bottoms and other places. It must not be mistaken for the plant known as *MERCURY*, or *GOOD KING HENRY* (*Chenopodium Bonus-Henricus*), used for food, and upon which we devote a separate article. The two species usually found are *M. annua*, known also as BARON'S MERCURY, and *M. perennis*, also known as KENTISH BALSAM. Detailed descriptions of these may be obtained by consulting works on wild plants.

MERCURIC CHLORIDE.— See *MERCURY COMPOUNDS.*

MERCURY, BARON'S AND DOG'S.— See *MERCURIALIS.*

MERCURY COMPOUNDS.

Very few compounds of mercury are of any value to the gardener, and are somewhat costly to experiment with. Mercuric and Mercurous Nitrate may have some future horticultural use, but at present, so far as we know, their effects on plant life in general have not been determined. The metal Mercury itself is largely used in thermometers under the name of QUICKSILVER, and if some is obtained from a broken thermometer it will be found to dissolve other metals to an appreciable extent. These solutions are known to chemists as AMALGAMS. Zinc is often immersed in a bath of the metal to be "amalgamated," and the majority of the sheets the gardener uses in his electric batteries, etc., are of metal so treated. If tin be dissolved in the metal, the product may be spread on the back of thick glass and this suitably framed, when a home-made mirror will result.

The only compound of mercury of much horticultural interest is *Mercuric Chloride*, popularly known as CORROSIVE SUBLIMATE. This may be used as a fungicide, putting about 1 oz. into 8–10 gals. of water; or as a worm eradicator as described in our article on *WORMS*. It is a deadly poison, so should always be kept under lock and key.

MERCURY, or Good King Henry (*Chenopodium Bonus-Henricus*, not of the genus *Mercurialis*. Nat. Ord. Chenopodiaceæ).—Although extensively grown in some parts of England (notably in Lincolnshire and on the eastern coast), this is but little known in others. It is generally regarded as an excellent substitute for Asparagus, giving splendid results, with but little trouble, in those districts where the more popular Asparagus can only be grown after considerable expense in the matter of soil preparation. In some quarters the plant is grown exclusively for the young leaves, which, when properly cooked, form a truly delicious vegetable, preferred by many to Spinach. It is quite an easy matter to raise a stock from seed, or young plants may be purchased from those who make a speciality of the crop.

Culture.—The seed should be sown in nice friable soil, as early in the spring as the state of soil allows, always avoiding land in a constantly water-logged condition. If more than one row is to be sown, allow at least a foot between the rows, and after the seedlings are well through the soil, thin out to about 9 ins. apart, at which distance each plant will make sturdy growth, and build up strong crowns from which good supplies of shoots or leaves should be taken the following year.

Although not usual, where the plants enjoy a deep, rich root run it is quite permissible to gather a few of the large outer leaves the first summer; but this should not be indulged in to such an extent as to weaken the plants.

Throughout the whole season of growth keep the bed free from weeds, and the roots moist by repeated applications of manure water. Always give the beds a top-dressing of rich manure previous to the plants making new growth in the spring.

F. R. C.

See also *CHENOPODIUM*.

MERODON. — See NARCISSUS BULB FLY in *INSECT PESTS*.

MERTENSIA (SMOOTH LUNGWORT. Nat. Ord. Boraginaceæ). — This is a genus of useful perennial border and rock garden plants, which are not as widely grown as they should be. Most of them flower freely, and will, when once grown, become favourite flowers. They succeed in ordinary light, rich, sandy soil which is not too moist, and are easily increased by seeds sown in the early summer, by cuttings of the young growths under a hand-light in August, or by division of the roots in the autumn or March, at which latter period they may be most successfully planted. We recommend the following for the perennial border:—

Mertensia alpina. — This is a species for edging, and bears blue flowers in May, only growing 6 ins. high.

M. maritima (OYSTER PLANT). —This also is useful for edging purposes or marginal patches to borders, though slugs are very destructive amongst it. Its blue flowers are borne in June and July, on plants 3–4 ins. high.

M. paniculata.—This is a pretty blue sort blooming from April to June, and growing 1½ ft. high.

M. pulmonarioides (Syn. *M. virginica*).—This is an attractive blue May flowering sort growing 1–2 ft. high.

M. sibirica.—This is a blue June flowering sort growing 3 ft. high.

M. virginica.—Syn. *M. pulmonarioides* above.

Rock Garden Species.—Only two species are really useful in the rock garden, and both are tufted, spreading perennials, readily increased by division of the roots in the spring. We briefly describe them below:—

Mertensia echioides.—This is a dwarf-growing plant bearing tufts of entire leaves. Flowers, deep blue with a yellow eye, in racemes. Site, half-shade. Soil rich, well-drained, and stony. Flowering Period, June. Height, 9 ins.

M. primuloides.—This is a spreading plant. Flowers, purplish-blue. Site, half-shade. Soil rich and gritty. Flowering Period, June. Height, 6 ins.

MESEMBRYANTHEMUM (FIG MARIGOLD. Nat. Ord. Ficoideæ).—This is a free-flowering, greenhouse succulent plant of easy culture, and is suitable as a window plant or for rockwork out of doors in summer. It is propagated by cuttings of half-ripened shoots in spring in sandy soil, and should be potted in good fibry loam, peat, and sand which is well-drained. Temperature required, 40–50° F.

Greenhouse Species.—*Mesembryanthemum bicolorum.* — Orange. Flowers in July. Height, 1–1½ ft.

M. capitatum. — Pale yellow. Flowers in August. Height, 1–1½ ft.

M. coccineum.—Scarlet. Flowers in July. Height, 1–1½ ft.

M. crystallinum (ICE PLANT).—An annual, with leaves and stem thickly covered with sparkling, ice-like globules. Flowers, pinkish shade, in August. Height, 5 ins.

M. fastigiatum.—White. Flowers in August. Height, 1–1½ ft.

M. formosum.—Crimson. Flowers in August. Height, 1–1½ ft.

M. incurvum.—Pink. Flowers in July. Height, 1–1½ ft.

See also *ANNUALS, HALF-HARDY: LIST OF.*

METALLIC ELEMENTS.—See *CHEMISTRY FOR GARDENERS.*

METAMORPHIC ROCKS.—See under KINDS OF ROCKS in *GARDEN GEOLOGY.*

METROSIDEROS (Nat. Ord. Myrtaceæ).—This is undoubtedly the best of all Myrtaceous plants. It can be grown as a bush, pyramid, or standard. It is allied to *LEPTOSPERMUM* (which see), and requires the same culture.

Greenhouse Species.—*Metrosideros floribunda* (BOTTLE BRUSH). — Bright red. Flowers in April and May. Height, 2–6 ft.

MEUM (BALDMONEY and SPIGNEL. Nat. Ord. Umbelliferæ). — The offering of this worthless genus is becoming quite a common practice, so we include it here for the purpose of warning readers not to purchase it. *M. athamanticum* is the best known species, and is found growing wild. It bears whitish flowers in June, and averages 1½ ft. in height.

MEXICAN ORANGE FLOWER.—The genus CHOISYA and *Choisya ternata.* See *CLIMBING AND TRAILING PLANTS* and *SHRUBS.*

MEZEREON (*Daphne Mezereum*).—See *SHRUBS.*

MICE.—See *GARDEN ENEMIES.*

MICHAELMAS DAISIES.—See *ASTER.*

MICHAUXIA (Nat. Ord. Campanulaceæ). — This is a small genus of striking hardy biennial border plants suitable for sunny sites. They may be raised by sowing seeds in warm, sunny borders out of doors in April, and subsequent thinning out to 2 ft. or so asunder, as they dislike being transplanted. Light protection in the winter is advisable in cold districts. The following are the best :—

Michauxia campanuloides.—This bears light red or rose flowers in July, on plants 4–5 ft. high.

M. laevigata.—This is a noble and striking plant producing white flowers in August, and growing 9–11 ft. high.

M. Tchihatcheffi.—This also bears white flowers, but blooms a month earlier than the last named species and averages 4–6 ft. high.—J. F.

MICRANTHES.—Now included in the genus *SAXIFRAGA.*

MICROLEPIA.—Now included in the genus DAVALLIA, for which see *FERNS AND FERN GARDENING.*

MICROSORIUM.—Now included in the genus POLYPODIUM, for which see *FERNS AND FERN GARDENING.*

MIGNONETTE (*Reseda.* Nat. Ord. Resedaceæ). — These fragrant plants are among the most popular of annuals, and deservedly so, as they are so easily grown. Their sweetness adds to the amenities of any garden. Where any difficulty is found in growing Mignonette, add some lime to the soil. Sow at intervals in spring and early summer, making the seed-bed firm, and thin out well ; if transplanting is done it must be when the seedlings are very small, as they are tap-rooted.

The best sorts are :—

Reseda alba. — A white summer blooming sort 2 ft. high.

R. lutea.—A yellow sort, blooming from June onwards, and averaging 1 ft. high.

R. odorata.—This is the fragrant Italian species from which the garden forms have been evolved. The varieties vary in colour, height, and robustness, many of them having been given distinctive names. There are cream-white, buff-yellow, golden, orange-buff, and red forms, ranging from 6–18 ins. in height. The *Matchet* variety is very sturdy, and makes a capital pot plant for winter flowering under glass.

MILDEW, APPLE.—See *APPLE DISEASES.*

MILDEWS.

In a botanical sense the term "mildew" is confined to special diseases of plants caused by a certain definite group of fungi, the *Erysiphaceae.* This group—the "true Mildews," or *Powdery Mildews* — is characterised by being quite superficial in its growth. That is, unlike the rust and most parasitic fungi, the mycelium (or system of fungus filaments) is external, and only inserts minute suckers into the host-plant to extract its food. In spite of this, mildews cause serious damage (*e.g.* mildews of apple, gooseberry, oak, rose, etc.). As a rule each host has its own particular mildew. From their superficial habit of growth, the mildew fungi are easily seen, and specially suitable to be controlled by the use of spraying mixtures or powders. The great secret is to apply early.

Some of the lower fungi are sometimes called *False Mildews* (*e.g.* Onion Mildew). Here, though the appearance suggests a true mildew, the mycelium is found to be internal. The False Mildews are in reality related to the Potato Blight fungus.
A. D. C.

MILFOIL.—See *ACHILLEA*, and under YARROW in *MEDICINAL HERBS*.

MILIUM (MILLET GRASS. Nat. Ord. Gramineæ). — *M. effusum* is the best species of this little genus of annual and perennial grasses. Unless the collection is a very large one, the genus may be dispensed with. Otherwise a place may be found for it in good light soil in the wild garden. This genus must not be confused with *SORGHUM*, which see.

MILK THISTLE (*Carduus benedictus*). A name applied to the HOLY THISTLE, which see in *MEDICINAL HERBS*.

MILK THISTLE (*Silybum marianum*). See *SILYBUM*.

MILK VETCH.—See *ASTRAGALUS*, and under ASTRAGALUS in *SHRUBS*.

MILK-WORT.—See *POLYGALA*.

MILKWEED.—See *ASCLEPIAS*.

MILLA.—Now included in the genus *BRODIAEA*.

MILLEPEDES.—See *INSECT PESTS*.

MILLET (*Panicum miliaceum*).—See *PANICUM*.

MILLET GRASS.—See *MILIUM* and *SORGHUM*.

MILLET, ITALIAN (*Setaria italica*).—See *SETARIA*.

MILLET RICE (*Panicum colonum*).—See *PANICUM*.

MILLSTONE GRIT.—See under SANDSTONE in *ROCKWORK*.

MILTONIA and MILTONIODA.—See *ORCHIDS*.

MIMOSA.—See *ACACIA*.

MIMULUS (MONKEY FLOWER. Nat. Ord. Scrophulariaceæ).—This is a genus of hardy and half-hardy annuals, hardy perennials, and rock plants. The two former classes are comparatively unimportant, but may be raised by sowing in heat in February and planting out later, after duly hardening them off. They are useful for summer bedding and for greenhouse decoration. There are numerous named hybrids to choose from in seedsmen's lists, and improved varieties are being introduced so frequently that no good purpose could be served by describing any here.

Perennial Border Species.—These are attractive, hardy plants, some of fine, tall growth, but mostly dwarf growing, and thus suitable for the margins of borders and so on. They succeed in good garden soil, but require plenty of water in the summer, and thus a damp, lightly shaded spot is desirable, or a moist bank near the water. In cold, exposed districts it is well to lift them and winter in a frame. They may be raised from seeds sown on a very fine, moderately firm, and very sandy seed-bed, in a frame in the spring or summer, and may also be propagated by cuttings in the summer, or by division of the roots in the autumn or early spring. March is the best time to plant. The following include the best sorts, the first two of which, as well as *M. luteus* and *M. radicans*, are splendid water garden plants. (See under MONKEY FLOWER in article on *WATER GARDEN: PLANTS FOR THE*).

Mimulus cardinalis. — A bright scarlet June flowering sort about 2 ft. high.

M. cupreus.—This is an exceedingly attractive orange sort flowering from June to August, and growing about 1 ft. in height.

M. glutinosus.—This is a useful sort for margins, and bears light purple flowers in July and August. It grows about 12 ins. high.

M. luteus.—This dwarf sort, useful for edgings, etc., bears yellow flowers in July and August, and grows 6–12 ins. high. Its varieties *alpinus* and *guttatus* bear copper-yellow and pale yellow flowers, and grow 6 ins. and 18 ins. in height respectively.

M. moschatus (MUSK). — This well-known creeping perennial is useful for margins, edgings, etc., out of doors, and is largely grown as a pot plant in the greenhouse. Its yellow flowers are abundant in July and August, on plants 6 ins. high.

M. radicans.—This, described in the next section, may also be grown with success in moist borders and in the water garden.

M. ringens.—This pretty sort bears pale blue flowers in July, and grows 12 ins. high.

Rock Garden Species.—The following two species are well worth a place in the rock garden, and are propagated by division of the roots in the autumn or spring, or by seeds sown in finely prepared beds out of doors in March.

Mimulus primuloides.—This is a dwarf creeping plant with tufts of hairy foliage. Flowers yellow on slender stalks. Site, half-shade. Soil moist, peaty, and gritty. Flowering Period, June to September. Height, 4 ins.

M. radicans.—This forms carpets of bronzy-green leaves. Flowers white, with a violet blotch. Site, half-shade. Soil moist, peaty, and gritty. Flowering Period, July to August. Height, 2 ins.

NEW VARIETY.

Mimulus Wargrave Fireflame.—This is a variety of *M. luteus alpinus* bearing scarlet-crimson flowers on plants 6 ins. high.

MINA.—Now included in the genus *IPOMOEA*. Its well-known garden variety (LOBATA) is described under *ANNUALS, HALF-HARDY: LIST OF.*

MINORCA BOX (*Buxus balearica*).—See *SHRUBS.*

MINT.—See under PEPPERMINT in *POTHERBS*, and also *MENTHA.*

MINT RUST.—See *DISEASES OF PLANTS.*

MIRABILIS.—See *MARVEL OF PERU.*

MISANDRA.—Now included in the genus *GUNNERA.*

MISCOPETALON.—Now included in the genus *SAXIFRAGA.*

MISSOURI CURRANT (*Ribes aureum*). See *SHRUBS.*

MISTAKES IN PLANTING.—See *BEDDING OUT: PRACTICAL HINTS ON.*

MISTLETOE.

This is in great demand at Christmas time and up to the New Year, although the custom of kissing under the mistletoe is dying out, except perhaps amongst sentimental young ladies and gentlemen. If it is desired to grow mistletoe, some ripe berries must be obtained, and one or two of them inserted in small cuts made in the bark of apple trees. The wound can then be bound over and the seed left to grow into the tree. Very little cutting will be possible until after the end of the third or fourth year.

MISTLETOE CACTUS (*Rhipsalis salicorcoides*).—See *CACTI.*

MITELLA (MITRE WORT. Nat. Ord. Saxifragaceæ).—This is a small genus of dwarf-growing plants which may be used in the rock garden or front portions (edgings, etc.) to mixed and other borders. All are hardy herbaceous perennials, which thrive under the treatment usually given such subjects, and may be propagated by root division in March, at which times they may be most suitably planted. *M. Breweri*, *M. diphylla*, and *M. nuda* are the best white sorts, blooming from April to July, and growing 3–6 ins. high. *M. pentandra* is a useful yellow sort blooming in June, and growing 6 ins. high.

MITRARIA.—For the best species see *CLIMBING AND TRAILING PLANTS.*

MITRE FLOWER (*Mitraria coccinea*). See *CLIMBING AND TRAILING PLANTS.*

MITRE WORT.—See *MITELLA.*

MIXED BORDER, THE.

In a recently published book (1917) there is an attack on what is popularly known as "The Mixed Border." The writer of the book makes some interesting statements worthy of consideration, but nevertheless we propose to praise Mixed Borders as much as we can in this Dictionary.

A Mixed Border is without limit in its possibilities. It need not be limited to hardy plants, nor to one class of hardy plant, as for instance the hardy herbaceous perennial. It may be composed of or planted with almost any and every plant under the sun (except, of course, stove-house subjects and tender climbers). Thus there are no bounds to the possibilities of colour, grace, and form which may be shown off in the border.

One border we saw last summer convinced us that "mixed" gardening was capable of producing superbly lovely effects both in colour and form. It contained in addition to the usual hardy and half-hardy annuals and perennials, numerous beautiful greenhouse annuals and greenhouse perennials. It was (in August), a sheet of colour from one end to the other, this being managed by having plants brought on in greenhouses and frames ready to plant out the moment the other plants were over.

If Mixed Borders are to be the enormous success they can be, then one has always to be on the watch. Plants may fail on account of the weather, and must be replaced immediately. Again deaths may occur owing to soil pests, or owing to lack of attention in watering. All these must immediately be made good. A large additional stock of plants is in any case required, which is apt to make this form of gardening somewhat expensive. But undoubtedly it is well worth doing.

Successful and beautiful Mixed Borders can only be obtained by careful and thorough study of the plants beforehand. Clashing colours *must* be avoided, height and habit as well as period of blooming must be allowed for, or what might be a beautiful Mixed Border will be an infamous fiasco. Alternative plants for filling in gaps caused by failures must be grown to be ready at once.

Careful attention to practical details such as staking, etc., must also be given, as described in the articles on *HERBACEOUS BORDERS.*

Plants Suitable.—Below are given the various sections of plants suitable for the present purpose, with the names of the articles in which lists may be found :—

HARDY AND HALF-HARDY ANNUALS.—The vast majority of the hardy annuals given in the list included in our article on *ANNUALS FOR ALL PURPOSES* are very suitable, while among half-hardy sorts all those given in our notes on *ANNUALS, HALF-HARDY: LIST OF*, may be used.

HARDY AND HALF-HARDY BIENNIALS.—Any of those in the list of Hardy and Half-Hardy Biennials included in our article on *BIENNIALS* may be used.

PERENNIALS. — All those mentioned in the article on *PERENNIALS FOR ALL PURPOSES* may be used, in the case of the hardy sorts, while all the half-hardy plants given in our notes on *PERENNIALS, HALF-HARDY: LIST OF*, are more or less suitable.

GREENHOUSE PLANTS :—*Annuals.*—A short list of Greenhouse Annuals appears at the end of the article on *Annuals for All Purposes*.

Perennials, etc. — An enormous number of greenhouse plants are available for this work provided that they are thoroughly hardened off before planting out. The best greenhouse plants are briefly described in alphabetical order throughout the work.—E.

MIXED PRODUCTS. — See under General Manures in *Manures*.

MIXING MORTAR.—See *Mortar*.

MIXING TOP-DRESSINGS. — See *Top-dressing*.

MOCK ORANGE.—The genus Philadelphus. See *Climbing and Trailing Plants* and *Shrubs*.

MOCK ORANGE (*Prunus caroliniana*). See *Trees*.

MOCKER NUT (*Carya tomentosa*).—See *Trees*.

MOEHRINGIA.—Now included in the genus *Arenaria*.

MOISTURE FOR SEED.—See *Germination of Seeds*.

MOLE CRICKET.—See *Insect Pests*.

MOLES.—See *Garden Enemies*.

MOLINIA (Nat. Ord. Gramineæ). This is a small genus of weedy perennial grasses quite unworthy of cultivation. *M. caerulea* (Syn. *M. varia*) is popularly known as Lavender Grass. It and its variety *variegata* may be seen at Kew.

MOLTKIA (Nat. Ord. Boraginaceæ).—Only one species of this genus (*M. petraea*) is grown at Kew. This is a blue-flowered hardy herbaceous perennial suitable for the borders though best in the rock garden, bearing its flowers from June to August, and growing about 6 ins. in height. It will succeed in light, rich garden soil, but otherwise requires the usual treatment for hardy perennials. The best way to propagate it is by division of the rootstock in March, at which time it may be successfully planted.

MONARDA (Bergamot, Horsemint, etc. Nat. Ord. Labiatæ).—This is a useful genus of hardy perennial border plants and herbs. American Horsemint is described in our article *Potherbs*, and Wild Bergamot with its delightful scent is almost too well known to need description. The cultural requirements of the genus are of the simplest; all thrive in good, rich garden soil, though this must be well on the moist side. They are best propagated by division of the roots in March, which is also a suitable time to plant. We recommend the following for herbaceous borders :—

Monarda citriodora. — This has lemon-scented foliage, and bears yellow flowers in August on plants 2 ft. high.

M. didyma (Syn. *M. fistulosa* of Curtis).—This, the Oswego Tea, is a favourite species with scented foliage and scarlet flowers, which last are produced in July and August on plants 3–5 ft. high. Various varieties of it are offered by nurserymen, of which *alba* is white; *Cambridge Scarlet* is, as its name implies, bright scarlet; while *kalmiana* (offered at times as a species) is bright red.

M. fistulosa (Wild Bergamot).—The variety *mollis* (Syn. *M. menthaefolia*) is far superior to the wild plant, and bears attractive lilac flowers from July to August, on plants 2 ft. high.

MONK'S RHUBARB (*Rumex alpinus*). See *Rumex*.

MONKEY FLOWER (*Mimulus*).—See *Mimulus* and *Water Garden: Plants for the*.

MONKEY PEAS.—See under Woodlice in *Insect Pests*.

MONKEY PUZZLE.—A name applied to the genus Araucaria, more especially to *A. imbricata*. See *Trees*.

MONKSHOOD.—See *Aconitum*, and see under Aconite in *Medicinal Herbs*.

MONTBRETIA (*Tritonia.* Nat. Ord. Iridaceæ).—The Montbretias come from South Africa. They bear yellow, orange, or orange-red flowers on long branched, wiry stems about 3–4 ft. high. They have sword-like leaves and rhizomatous roots, which every now and again swell into corms. Most of the newer hybrids, *e.g.* the *Earlham Hall* varieties, are not perfectly hardy, and need to be lifted annually; but some of the older varieties may be treated as hardy plants. Their flowering season is late summer and early autumn.

Culture.—Montbretias like light, rich, well-drained soil and a sunny position. All the varieties should be planted in early April, and the more tender ones lifted in October, the corms being stored in sand all winter in a frost-proof place until the time for planting comes round again. When in active growth they need occasional watering with some weak stimulant to bring them to the highest perfection.

Montbretias may be grown indoors by potting up the corms in the early part of the year, plunging the pots up to the rim in ashes in a frost-proof frame and bringing them into a greenhouse in early June. For getting seed, indoor culture is essential, but red spider must be guarded against.

Varieties[1]: *Tritonia citronella.*—A pale yellow and highly decorative sort. Height, 3½ ft.

T. Croesus.—An orange or yellow sort about 3½ ft. high.

T. Etoile de Feu.—A glowing orange-red sort. Height, 2½ ft.

T. George Davison.—This also is orange, and grows about 3 ft. high.

T. George Henley.—A chrome-yellow sort with flowers tinged with red. Height, 3½ ft.

T. Germania.—An attractive orange-scarlet sort growing 4 ft. high.

T. King Edmund.—A golden-yellow sort with carmine centre. Height, 3½ ft.

T. Lady Hamilton.—The flowers of this are apricot-yellow, and charming shape. Height, 3½ ft.

T. Prometheus.—A sort with fiery orange flowers, growing 4 ft. high.

T. Queen Adelaide.—A sort with immense deep orange flowers shading to red. Height, 4 ft.

T. Queen Alexandra.—A sort with pale apricot-yellow flowers, and dark eyes. Height, 4 ft.

T. Queen Mary.—A light orange-yellow sort. Many flowers on this variety open out at once. Height, 3½ ft.

T. rosea.—This is a lovely shade of pink, with slender stems and quite unlike the others in its general appearance. Height, 2 ft.

T. Star of the East.—This has orange-yellow flowers with a lemon eye, and grows 3½ ft. high.

All the above varieties flower in either August or September.

J. J. & E. T. E.

UP-TO-DATE SELECTIONS.

Tritonia Californica.—Golden-yellow.

T. Earlham Large-Flowered.—Many colours.

T. Eldorado.—Orange yellow.

T. Fiery Cross.—Orange.

T. Fire King.—Scarlet-red.

T. Lord Nelson.—Orange-scarlet.

T. Rayon d'Or.—Golden yellow.

T. Superfine New Hybrids.—Many colours.

T. speciosa.—Orange and yellow.

T. His Majesty.—This bears yellow flowers, shading to crimson-scarlet.

---

[1] Only two Tritonia species figure in the *Kew Hand-list.* These, *T. crocosmaeflora* and *T. Pottsii*, are relatively unimportant.—EDITOR.

MONTEREY CYPRESS (*Cupressus macrocarpa*).—See *TREES*.

MONTEREY PINE (*Pinus insignis*).—See *TREES*.

MONTHLY ROSE (*Rosa indica*).—See *ROSE SPECIES*.

MONTPELIER MAPLE (*Acer monspessulanum*).—See *TREES*.

MONTPELIER PINK (*Dianthus monspessulanus*).—See *DIANTHUS*.

MOON-FLOWER (*Ipomoea Bona-Nox*).—See *CLIMBING AND TRAILING PLANTS*.

MOON-WORT.—A name applied to *SOLDANELLA*, which see.

MOONLIGHT (*Ilex Aquifolium flavescens*).—See *HOLLY*.

MOONSEED (*Menispermum canadense*).—See *CLIMBING AND TRAILING PLANTS*.

MOOR GRASS (*Sesleria coerulea*).—See *SESLERIA*.

MOOSE WOOD (*Acer pennsylvanicum*). See *TREES*.

MOP-HEADED CATALPA (*Catalpa Bungei*).—See *TREES*.

MORAEA (Nat. Ord. Iridaceæ).

None of the numerous species of this genus are common in British gardens. The one mentioned here, the best known of the family, is only hardy in very favoured positions, but when pot-grown makes a pleasing and uncommon decoration in the conservatory.

Culture.—The bulbs should be planted, five or six in a 5-inch pot in autumn and wintered in a cold frost-proof frame. They may be removed into a cool greenhouse in February or March. It is best to lift bulbs planted in the open ground every year.

Species: — *Moraea glaucopis*. — This bears in June small iris-like flowers which are pure white with a real blue spot on each of the outer segments. Height, 1 ft.—J. J.

[The two species figuring in the *Kew Hand-list of Herbaceous Plants* are *M. iridioides*, and *M. spathacea*. The first bears white flowers in July, and the second clear yellow flowers in the early spring. The height averages 6–12 ins.—EDITOR.]

MORAINE GARDENING.

It is completely deplorable that this form of gardening is still in its infancy, for it is the best and surest means of growing practically all the most difficult of the Alpine gems, and this being so, we hope the few hints below may be useful.

First of all, let us be quite clear as to what a Moraine is. Briefly, it is the accumulation of stones and other débris found at the foot, along the edges, or down the centres of glaciers, and at the foot of precipitous cliffs. Such a compost is very porous, affording absolute drainage for the plants, and tending to keep them warm and dry during the winter months, when, in their native habitats, they are covered with frozen snow. As the summer advances, the plants on these natural Moraines are watered continuously by the melting snow, which keeps the compost cool and moist, without stagnation, owing to its porosity. This is the growing season for the many gems which are found on these natural Moraines, and thus we find, if we would imitate Nature, we must, in making an artificial Moraine, first, have a porous compost of sufficient depth, with ample drainage beneath; secondly, provide ample water for the needs of the plants during their growing season; and thirdly, arrange that the plants may be kept as dry as possible during the autumn and winter months, when growth has ceased and they are quite dormant. These conditions are the *sine qua non* for all who desire to make a Moraine, and who wish to grow plants well and successfully on it. As the climatic conditions in the British Isles are somewhat erratic, and we often get a superabundance of rain when we least require it, Moraine gardening is sure to be a successful way of growing the choicest Alpine gems which would fail under ordinary rock garden conditions.

Making a Moraine.—When making a Moraine it should, when possible, be at the foot of a precipitous cliff, where the ground slopes gently to the south or south-west. Excavate the portion intended for a Moraine to the depth of about 3 ft., filling in with rough cobble stones to half that depth, and then cover the same with leaves or thin turves in order to keep the drainage clean. The compost, which should consist of, say, 4 parts of chips to 1 part of sifted loam, peat, leaf-mould, and sharp sand well mixed, should then be added to fill up to the required level. If limestone, granite, or sandstone chippings (preferably screened through a ⅛-inch riddle) cannot be obtained locally, clean gravel or well-washed sharp river sand may be used in the proportions already given. Flat stepping-stones can be sunk level with the surface of the Moraine, and these can be placed irregularly 12–15 ins. apart, so that one may be able to get easily amongst the plants without any danger of stepping on them. A few boulders may also be introduced, and arranged naturally, to break the monotony, and to provide partial shade for such plants as do not require full sun.

Watering.—Regarding this, in the summer months subterranean watering is preferable. This can be arranged by means of ½-inch pipes connected to the main with a stop-tap, and perforated on each side with minute holes four inches or so apart. These should be placed 4–6 ins. below the surface, and when autumn comes the stop-tap should be closed to allow the water to drain from the pipes. Another system is to procure a bamboo curtain-pole, and cut it into sections below each joint. These will provide a number of tubes with one end sealed. Perforate these with minute holes and insert into the Moraine 12–18 ins. apart. Fill these tubes with water as often as necessary, and allow this to percolate gradually through the compost, repeating the process whenever the weather is hot and dry.

What to Grow.—We give below a list of plants suitable for growing on a Moraine, which, though far from complete, may serve as a guide to those who intend to take up this interesting branch of Alpine culture. Those plants with a single star in front of their name require a non-calcareous soil, and those with two stars need moist shady situations. It should be noted that *Ranunculus glacialis* requires both these conditions:—

	Inches
*_Androsace alpina_ (Syn. _A. glacialis_). Rose white. May and June.	1
*_A. argentea_ (Syn. _A. imbricata_). White. May and June.	1
A. villosa. Pearly white. May and June.	3
Artemisia splendens. Silvery foliage. May to July.	4–6
Asperula Athoa. Pink. May to July.	3
Aster alpinus. Purple. May to July.	6–8
Campanula acuteangulare. Deep purple. July and August.	4
*_C. alpestris_ (Syn. _C. Allionii_). Purple. June and July.	3
*_C. cenisia._ Electric blue. June and July.	2
*_C. excisa._ Violet. July and August.	4
C. pulla. Deep violet. July and August.	6
C. Raineri. Blue. July and August.	3
C. Zoysii. Blue. July and August.	4
**_Cyananthus lobatus._ Blue. July and August.	4

	Inches
Dianthus alpinus. Rich rose. June and July.	4
D. arvernensis. Pink. June and July.	4
D. callizonus. Deep rose. June and July.	4
D. Freynii. Blush. June and July.	2
*_D. glacialis._ Rose. June and July.	4
*_D. neglectus._ Fiery rose. June and July.	4–6
D. nitidus. Rose. June and July.	6
D. sylvestris. Rose. June and July.	8
*_Eritrichium nanum._ Dazzling blue. June.	2
Iberis saxatilis (Syn. _I. petraea_). White. June.	3
Leontopodium alpinum. Silver-white foliage. May to August.	6
Linaria alpina. Violet and gold. May to August.	3
Lithospermum Gastoni. Blue. June and July.	6
**_Mertensia primuloides._ Blue to amethyst. June and July.	6
Morisia hypogaea. Yellow. April to June.	3
Myosotis rupicola. Blue. June.	3
Papaver alpinum. White, yellow, rose. May to August.	6
Petrocallis pyrenaica. Pinky-white. June.	2
**_Primula intermedia._ Rosy-lilac. May and June.	4
**_P. spectabilis._ Rosy-lilac. April to June.	4
**_Ranunculus alpestris._ White. May to August.	4
**_R. bilobus._ White. May to August.	4
**_R. glacialis._ White and shades of red. May and June.	6
**_R. parnassifolius._ White. May and June.	6
**_R. Seguieri._ White. May and June.	6
*_Saponaria lutea._ Yellow. June.	3
Saxifraga Aizoon. Rosy-pink and white. May and June.	6
S. Burnati. White. June.	6
S. burseriana in its many forms. White. February and March.	3
S. caesia. White. June.	4
S. Faldonside. Yellow. March.	4
S. Grisebachii. Red. March and April.	6
*_Silene Elizabethae._ Rose-red. June.	4
S. Hookeri. Rose-pink. June.	6
*_S. Pumilio._ Pink. June.	3
*_Soldanella pyrolaefolia._ Lilac. March to April.	4
Thlaspi limosellaefolium. Lilac. May to June.	4
T. rotundifolium. Lilac. May and June.	4
Veronica canescens. Blue. May to July.	2
Viola cenisia. Violet. May to July.	4
Wahlenbergia (Syn.Edraianthus) _Pumilio._ Violet. May to June.	4
W. serpyllifolia major. Deep violet. May to July.	4

The culture of many of these plants is more fully described under their respective genera.—G. R.

MORAINES : PLANTS FOR. — See *MORAINE GARDENING.*

MOREL. — See EDIBLE FUNGI in *FUNGI : EDIBLE AND HARMFUL.*

MORELLO CHERRIES.—See *CHERRIES.*

MORELLO CHERRY (*Prunus Cerasus*). See *TREES.*

MORINA (Nat. Ord. Dipsaceæ). This is a genus of herbaceous perennials which are not very hardy, and thus require wintering in a frame or greenhouse, otherwise the culture usually given to perennials will be successful. *M. longifolia* (Syn. *M. elegans*), the WHORL-FLOWER, is the best known species, with its purple flowers in July on plants 2–3 ft. high. *M. coulteriana* (Syn. *M. brevifolia*) is a yellow species also blooming in July, but only growing 9–18 ins. high. *M. persica* (Syn. *M. wallichiana*) is a species bearing white and red flowers from June to August, and grows 2 ft. high. The first and the last species are hardy in the warmer parts of the country.

MORISIA (MEDITERRANEAN CRESS. Nat. Ord. Cruciferæ).—The only species in general cultivation is a pretty dwarf plant with pinnate leaves. It is propagated by root cuttings in autumn, or by seeds sown in March.

Morisia hypogaea.— This has rosettes of serrated deep green leaves. Flowers bright yellow. Site open. Soil gritty loam. Flowering Period, March to July. Height, 2 ins.

MORMODES.—See *ORCHIDS.*

MORNING GLORY (*Ipomoea purpurea*).—See *CLIMBING AND TRAILING PLANTS.*

MORTAR.

Although it does not often happen that the gardener has to turn into a builder and build his own house, it is distinctly useful for him to be able to do a bit of building, pointing, concrete work or plastering, if occasion should arise, and with the idea of assisting him with the mixing of mortars, concretes, and plasters successfully, we are giving this little article. Taking mortar first there are many grades which come in useful for various purposes. It would, for instance, add greatly to the cost of building a frame if we were to use cement for holding the bricks together, when ordinary common mortar would do, and it would be foolish indeed to waste first-grade mortar on making the foundations of a new hotbed, frame or pit. So our first advice to the gardener is, to study the purposes for which he requires his mortars, concretes, and plasters, and make them accordingly.

Rough Mortar.—Rough mortar is inexpensive to make, and exceedingly useful for many purposes, such as for laying foundations, and other brick or stone laying where quick hardening is not essential. The mixture consists of the following materials, the proportions being bulk for bulk in this and every other case in this article :—

Builders' lime . .	1 part.
Builders' sand . .	2 parts.
Fine ground ashes .	2 parts.

The sand and the ashes should be mixed together first, and the lime added, after which the mortar is mixed in the usual way, as described under a separate paragraph.

Hair-Mortar.—Where it is desirable for the mortar to stick together rather better than the above mixture does, the addition of hair is advisable, and of the many kinds to choose from none is better than cow hair. The mixture is then made in the following proportions :—

Builders' lime . .	2 parts.
Builders' sand . .	4 parts.
Fine ground ashes .	4 parts.
Cow hair . . .	1 part.

The precautions described below under MIXING MORTAR when it contains hair should be strictly observed.

First-Grade Mortar. — Where a better mortar than either of the above is required, and one which will in the ordinary course of events speedily harden, the following mixture is advisable :—

Builders' lime . .	1 part.
Builders' sand . .	2 parts.

If it is desired that this shall bind even better than it ordinarily does, the addition of one part hair to ten parts of the above mixture will effect this.

Quick-Setting Mortar.—It may be necessary for special reasons to use a mortar which will set very quickly, and to make this is quite easy. To every two barrows of the dry first-grade mortar above, a builders' bucketful of Portland Cement should be added, and the mortar made and used without delay.

Mixing Mortar. — Experienced builders, of course, can mix mortar in any way which pleases them best, but amateurs would do well to give special attention to the correct mixing.

First of all, the materials should be carefully proportioned out and mixed dry on a hard bed which will not pick up, or better still on a flagged pavement. It is quite impossible to mix the materials by merely turning over the heap once with a shovel. At least three turnings should be given, the material being turned over on to a new piece of ground adjacent to the old heap, but the whole of the heap must be completely moved. It is well to shovel from the outside inwards, not from the inside outwards, as heavier material always collects on the outer margins of the heap.

Where any light material such as hair is used for making the mortar bind better, much care in the mixing is advisable, otherwise the whole of the hair will accumulate in one portion of the pile, generally in the centre, instead of being evenly diffused throughout the whole. The hair should first be thoroughly teased out, to have it as fragmentary as possible, and should then be slowly mixed with the other materials in a dry state. On no account should any water be added, otherwise complete mixing is impossible. When it is seen that the hair is evenly diffused throughout the whole, and there are no bulky lumps of it anywhere, then water can be mixed with the dry material as is described below.

First of all, dig a hole in the centre of the pile with a shovel, and into this pour the water from a bucket a little at a time to give it a chance to be absorbed. When the hole holds water start working from the centre, and stir the material round and round with the shovel until all that water is absorbed; then add more, stir again, add more, and so on until the water begins to penetrate into all parts of the heap. Then get an assistant to spray the whole of the heap with a very fine-rosed can, while you turn it over on to another piece of adjacent ground. When the whole pile has the appearance of thick mud it is time to start working it as builders' labourers do, by driving the shovel into it in an upright position, and gradually working this in and out of the mixture at a slight angle. The mortar produced will then have a slightly shiny appearance on it. It will be soft and plastic, but no longer muddy. The water will be diffused throughout the whole, and all the materials will be evenly mixed together.

As gardeners know to their cost mortar does not keep indefinitely. If a pile is left over the week-end, the outside will have set hard if hot weather ensues. The best way to prevent annoyance of this kind is to put a few boards over the pile and make a hole in the centre, filling this with water. The mortar will then be fit to mix on Monday morning.

Concrete.—Turning now to concrete which is more or less allied to mortar, we have to admit that very few gardeners are able to mix it. The material, however, is so useful, for floors, or bases of pits or frames, or stands for pot plants out of doors, that every gardener should be able to mix it for himself. The following proportions make first-class concrete :—

Hard stone . . .	4 parts.
Builders' sand . .	2 parts.
Portland cement . .	1 part.

The stone should first of all be broken up with a coal hammer, or better still, by means of a light road-mender's hammer, to about walnut size or a little larger. It is then put on a hard floor as in the case of mortar, and the two light materials, sand and cement, are mixed together in a separate pile first of all, and then added to the stone. The whole mass should be turned over three or four times in a dry state, to ensure even mixing, after which water can be added, and the mass turned and worked repeatedly as before. No more concrete should be mixed than can be used in a day, as it sets very quickly.

Cement for Facing.—For ordinary facing of concrete, brickwork, or other material the following mixture will be good enough:—

Builders' sand . .	3 parts.
Portland cement . .	1 part.

Where, however, it is desirable that the material shall set very hard and last for a much longer period, it is well to strengthen the mixture and make it as follows:—

White sand . . .	2 parts.
Portland cement . .	1 part.

The materials should be mixed dry as before, and very little should be made at a time as the material will set hard in a few hours.

Hydraulic Cement.—It may happen that material which will set under water is wanted by the gardener, especially if he is making a pond or water garden. Various preparations of Hydraulic Cement are on the market, and, of course, it is not our duty here to praise any one more than another. The mixture, however, for facing such a pond is made as follows:—

Hydraulic cement . .	1 part.
Builders' sand . .	2 parts.

A layer of about an inch thick is exceedingly ample, and very often half an inch will be quite sufficient.

Plaster for Backing.—Sometimes roughly-constructed frames need backing or lining, and for this purpose rough plaster is the most suitable material. This is made as follows:—

Common plaster of Paris .	1 part.
Builders' sand . . .	3 parts.

The sand and the plaster should first of all be mixed dry, and the mixture then put gradually into a tub of water of fair size (half a butter tub is suitable), as a large quantity of water is absorbed, and well stirred. The material will swell up, and if there is excess of water this can be quickly run off just before use. Rapid plastering is essential for success, as the material sets almost while the work is being done.

Binding Plaster.—Gardeners who are unused to plastering are almost certain to find thatthe above mixture does not bind or stick on very well, and although experienced plasterers might be able to make it keep on, some of it is almost certain to fall off when made by amateurs. To obviate this, the addition of hair is advisable, and about one part hair to five, six, or eight parts rough plaster is about right. The hair should be teased out as before, and mixed with the material in a dry state, the mixture then being thrown into water, and applied with the greatest possible speed.

Best Plaster.—In such cases as the insides of greenhouses, which are constantly in view, a better plaster is advisable. This is easily made as follows:—

Best plaster of Paris .	2 parts.
Best white sand . .	6 parts.
Cow hair	2 parts.

The best plaster sets even quicker than common plaster, so that it is necessary to have an assistant constantly standing by turning the mixture over with a shovel and watering it while the worker applies it. A very large mortar trowel is the best tool to use, the material being thrown at the wall with considerable force, and levelled over within a minute of its application. The worker should have a board of the well-mixed plaster put as near the wall as possible; and the throwing is best done from within a few feet of the wall. A start should in any case be made from the bottom of the wall, as this is easier for beginners. Plaster will not keep for more than a few hours, so only what can be used at one time should be mixed.

Lime Plaster.—Another kind of plaster is useful for the commoner work, namely, Lime Plaster. This is easily made as follows:—

Obtain a large cask or wooden barrel, and half fill it with cold water. Into this barrel throw some lumps of fresh-burnt quicklime, a few at a time, and stir the water up. Soon the lime will fall and the water will be boiling. When it has cooled down somewhat, add a further supply of the lime, until a thick, sticky paste is formed with no surplus water. Turn this out of the barrel, and work it well with a spade or shovel in the same way as mortar, applying it with a mortar trowel as before.

If the addition of hair is desirable to make it bind better, the lumps of lime should be lightly slaked with water first of all until they fall to a fine powder. They should then be mixed with the hair in the following proportions:—

Slaked lime (dry) . .	5 parts.
Cow hair	1 part.

The thoroughly incorporated mixture should then be dropped in the water as before, and well stirred until a thick, sticky paste is formed, and this is applied with a mortar trowel in the usual way.

If the mixture is not made in a barrel a great deal of water is wasted and a certain amount of lime as well, since the water has to be largely in excess of the lime to obtain the desired paste.—E.

MORUS.—For the best species see *TREES.*

MOSS.

There are various kinds of mosses, some useful to the gardener and others useless. Moss as a weed is treated in our article on *WEEDS.* PEAT-MOSS LITTER is dealt with in our article on *HORSE MANURE,* while SPHAGNUM Moss is referred to in our article on *ORCHIDS: POTTING AND WATERING OF.*

See also *WEEDS.*

MOSS CAMPION (*Silene acaulis*).—See *SILENE: ROCK GARDEN SPECIES.*

MOSS PINK (*Phlox subulata*).—See *PHLOX: ROCK GARDEN SPECIES.*

MOSS ROSE (*Rosa gallica muscosa*).—See *ROSE SPECIES.* For best varieties see *ROSE CLASSES.*

MOSS RUSH (*Juncus squarrosus*).—See *JUNCUS.*

MOTHER WORT (*Leonurus Cardiaca*). See *LEONURUS.*

MOTHS.

A number of interesting and beautiful moths are mentioned in the article on *INSECT PESTS.* Moths do a very great deal of damage indirectly, as also do butterflies, by laying eggs which hatch out into caterpillars. Probably two of the worst moths are the *Heart and Dart Moth* and the *Turnip Dart Moth.*

In order to prevent the caterpillars being hatched, it is advisable to catch as many of the moths as possible. These moths fly about on still summer nights, and an ingenious method of destroying them, which does not occur to most people, is to put a few lighted candles about the garden where the moths seem fondest of flying. The moths are attracted by the lights and fly into them, thus committing suicide. They can, of course, be caught with a butterfly-net, but most gardeners have something better to do than to be dashing about the pleasure-grounds after a few moths.

MOTTLED UMBER MOTH. — See under WINTER MOTHS in *INSECT PESTS.*

MOUND LAYERING. — See under LAYERING in *PROPAGATION OF PLANTS.*

MOUNT ETNA BROOM (*Genista aethnensis*).—See *SHRUBS.*

MOUNTAIN ALDER (*Alnus viridis*). See *TREES.*

MOUNTAIN ASH (*Pyrus Aucuparia*). See *TREES.*

MOUNTAIN AVENS.—See *DRYAS.*

MOUNTAIN BLADDER FERN (*Cystopteris montana*).—See *FERNS AND FERN GARDENING.*

MOUNTAIN BUCKLER FERN (*Nephrodium montanum*).—See *FERNS AND FERN GARDENING.*

MOUNTAIN CHERRY (*Prunus angustifolius*).—See *CLIMBING AND TRAILING PLANTS.*

MOUNTAIN CLEMATIS (*Clematis montana*). — See *CLIMBING AND TRAILING PLANTS.*

MOUNTAIN CUDWEED.—The Kew name of *Antennaria dioica.* See *ANTENNARIA.*

MOUNTAIN LIMESTONE.—See under LIMESTONE in *ROCKWORK.*

MOUNTAIN MAGNOLIA (*Magnolia acuminata*).—See *TREES.*

MOUNTAIN MAPLE (*Acer spicatum*). See *TREES.*

MOUNTAIN PARSLEY (*Cryptogramme crispa*). — See *FERNS AND FERN GARDENING.*

MOUNTAIN PINE (*Pinus montana*).—See *TREES.*

MOUNTAIN SORREL (*Oxyria digyna.* Nat. Ord. Polygonaceæ).—This, a hardy herbaceous perennial of very easy culture, should be distinguished from the SORREL (*Rumex*) grown and used as a salad and vegetable, upon which we devote a separate article. *O. elatior* is now no longer recognised as a species, but is the variety *elatior* of the species under notice, while *O. reniformis* is a synonym of *O. digyna.* It is a plant of no importance, bearing only insignificant greenish flowers in June, on plants 6 ins. high.

MOUNTAIN SPINACH.—See *ORACHE.*

MOUNTAIN WOLFSBANE (*Ranunculus Thora*).—See note at end of *RANUNCULUS.*

MOUSE-EAR CHICKWEED.—A popular name for *CERASTIUM*, which see.

MOUSE-EAR HAWKWEED (*Hieracium Pilosella*).—See *HAWKWEED.*

MOUSE GRASS (*Aira caryophyllea*).—See *AIRA.*

MOUSETAIL GRASS (*Festuca Myuros*). See *FESTUCA.*

MOUTAN (*Paeonia Moutan*). — See *SHRUBS.*

MOVEMENT OF PLANTS.—See *PLANT PHYSIOLOGY.*

MOWING.—See *LAWNS AND THEIR MANAGEMENT.*

MOWING MACHINES.—See *GARDEN APPLIANCES.*

MUEHLENBECKIA. — For the best species see *CLIMBING AND TRAILING PLANTS.*

MUEHLENBERGIA (AMERICAN DROP-SEED GRASS. Nat. Ord. Gramineæ).—This is an unimportant genus of hardy grasses of no garden value.

MUGWORT.—See *MEDICINAL HERBS*, and under ARTEMISIA in *SHRUBS.*

MULBERRY.

This is best grown as a standard, and can be bought in a fruiting condition; where young trees are planted they take six to eight years to arrive at a fruitful state. In planting, it is material to preserve all the roots, and not to cut them at all, or the tree may be checked for years. It prefers a rich warm soil, and does not succeed in clay or heavy land. It grows into shape without pruning.—G. B.

See also MORUS in *TREES.*

MULCHING.

Mulching is the operation of putting a layer of soft, moist material over the surface of the soil for the purpose of conserving the moisture. It is quite distinct from top-dressing, upon which we give a separate article, as the object of mulching is not mainly for the purpose of increasing the food supply of the soil, or giving additional food to plants, but merely to protect the surface soil and the roots of the plants from undue evaporation. In the summer months, especially on light soils, evaporation is very rapid, and even on the strong soils, the roots of the plants get dry very quickly, although hoeing and cultivating may be persistently done. The object of mulching, then, is to check this evaporation, to retain the soil water in the soil for the plants to use, and at the same time to keep the roots of both flowers and vegetables cool and vigorous even in the hottest of hot weather.

Mulching Materials.—Recognising, then, the purposes of mulches, many materials are available which are quite unsuitable for top-dressing. The mulching materials used need not be exceedingly rich, so long as they have the power of retaining moisture, and this opens a wide range of material for the purpose. The selection of the best mulching material must depend more or less on the kind of soil above which it is to be spread. For poor, dry soils it is advisable to use fresh or moderately fresh cow manure, and the greener this is the better. For soils rich in plant food, and which are on the strong side, the use of such a sticky manure would be quite undesirable. What is known as old hotbed manure would be greatly preferable in this case, and that which is most mild in action is the material which is about twelve months old. Where, however, a supply of that material is not available, month-old manure from the stable or farmyard can be used without any detrimental effect, though the use of manure which is fresher than four weeks old may produce some bad results. The residue from liquid manure tanks is specially useful for application as a mulch to very light, sandy soils, but care must be taken that this does not set into a hard layer with a skin on, otherwise it will be valueless as a mulch.

A much cheaper material for use as a mulch on soils which are not over light is found in lawn mowings. These should be fresh, and put on in a thick layer of not less than 3 ins., as they soon rot away almost to nothing. Where, however, the soil is very light, it would be a mistake to apply the mowings in a fresh state, as they will go to nothing on the first hot day. In that case it would be well to use them after allowing them to rot in a heap in the manner described in our article on *Lawn Mowings*. This material can be spread on in a layer about 2 ins. thick, and will be exceedingly valuable as a mulch.

The use of fresh leaves as a mulch is not desirable, but on the other hand, for mulching flower borders, year-old leaf-mould is exceedingly valuable, and a much thicker layer of this should be used for mulching purposes than would be applied as a top-dressing. The material should be cut down from the leaf-mould stack with a sharp spade, and should not be cut too small, otherwise it will be less valuable. It is then spread on with a fork in the usual way. The use of this leaf-mould on the flower borders is greatly preferable to the use of farmyard or stable manure for two reasons. First, on account of it being practically inodorous, and thus quite free from objection in that direction; and secondly, because the birds will not peck it, scratch it out, or throw it about in the same way as they would manure, on account of the fact that it contains very few or no grubs.

Various kinds of fibre, such as cocoanut fibre refuse, can also be used for mulching, provided that small areas only are to be undertaken. The results obtained from the use of these fibres are usually excellent, but, of course, their great cost prevents them being regarded as economic materials.

What Not to Use.—It may be well to draw attention to some materials which are quite unsuitable for use as mulches, and these materials happen to be far cheaper than any of those which we have named, as well as being more easy to obtain in large quantities. Special care should be taken to avoid such an objectionable mulching material as road scrapings, or dried road sweepings, and we are astonished to find how generally the use of these materials for the purpose named is advised. The reason why we condemn them is simple: Road sweepings, as soon as a heavy storm of rain falls upon them, set into a hard, cakey material which rapidly cracks and lets out more moisture than even the soil would do if it cracked. It stops air from getting to the roots of the plants and checks healthy growth, which is, of course, a very serious item to consider. Moreover, road sweepings are usually full of all manner of objectionable weed seeds, which after a shower of rain and a bit of sunshine will rapidly germinate, and cause great trouble. Road sweepings are perfectly admissible as a lightening material for the soil if dug in deeply, but for purposes of mulching they are not only useless, but harmful.

Another material the use of which is highly objectionable as a mulch is found in pond mud, which is obtainable in large quantities during most dry summers. The material is exceedingly rich both in vegetable and animal matter, and its use as a mulch is most tempting. Those inclined, however, to apply it should first of all arrange to clear out a piece of water when it is reasonably low, and should make a stack of the material in some spot as sunless as possible. In a short time a hard, rock-like cake will form on the surface, which is quite impenetrable to roots of plants and to the air. This material will get harder and harder as the weeks pass. In contact with hot sun on the surface of the soil the cake will form harder and quicker. Thus the reason of the advice not to use this material is almost obvious. As we have already pointed out, pond mud is very rich, but its use, even for digging into the soil, should be most carefully controlled, as it may prove to have a far greater stimulating effect on the plants than is expected or desired.

Yet another material which is objectionable as a mulch is what is known as sewage refuse. This material is produced by the weathering of sludge cake from sewage works, and is in itself a very rich and desirable manure, and should be used for that purpose on light, sandy soils. As a mulch, however, it is inclined to set hard and cakey on the surface, and as a rule it is objectionable on account of its odour.

Turning now to vegetable materials which are objectionable for use as mulches, we have already mentioned that this is the case with fresh leaves. Another material of a similar nature, which is more objectionable still, is found in pine needles, which, in contact with the soil, lose some of their oily, resinous matter, and serve to poison it. The gardener will observe that very few subjects succeed under pine trees where a mulch of this material, namely, fallen pine needles, is so abundant, and thus should not be deceived by frequent advice given in the gardening papers to make use of these needles as a mulch for his plants. As we have pointed out in another article, pine needles are extremely valuable for starting a garden fire, but that is about the limit of their use.

Two other vegetable materials which are objectionable for use as mulches are found in peat or moss. The use of the latter is, of course, wholly objectionable, but Rhododendrons may be successfully mulched by the application of fresh peat from bogs or moors. For other crops, however, peat as a mulch must be regarded as distinctly objectionable, on account of the acid in it, which it will rapidly convey to the soil. A method of sweetening peat for use as a manure for non-ericaceous crops exists, but as a rule this is too expensive to have much practical value.

Turning now to mineral materials which are objectionable to use as a mulch, we must point out that most of them come within this category. Flue Dust, Soot, Wood Ashes, Ground Bones, and most other fertilisers, may be used as a top-dressing, in combination with other composts or manures, but not as mulches. Their purpose is for feeding, rather than conserving moisture. One material, however, which may be mixed with the surface of the soil for the purpose of enabling it to retain its moisture is Salt, used at the rate of about 1 oz. to the sq. yd., or Magnesium Sulphate may be used at a rather less rate for the same purpose. These materials must not, however, be regarded strictly as mulches, but rather as physical additions to the surface of the soil.

Preparation for Mulching. — Mulches will be of little value if applied to hard-baked soils which have not had any previous preparation. It would be well in every case to loosen the surface soil thoroughly with a hoe or cultivator, and if it is at all dry, to soak it well with water before applying any mulch. A deep, long-toothed cultivator is advisable for use on allotments and in the kitchen garden, but an ordinary Dutch hoe is quite satisfactory for border work.

The thickness of mulches varies, of course, with the length of time they are to last, but 3 ins. or 4 ins. is about the best and most satisfactory. Thicker mulches may chill the roots, and thinner mulches will be practically useless.

Mulches require to be renewed several times during the summer, and the old mulch can then be raked off, thoroughly soaked with water or liquid manure, and applied to a smaller area. About four renewals will be necessary for an average season, but many more if hot weather starts in May and continues until the end of the autumn.

E. T. E.

See also *ORCHARD: MAKING AND MANAGEMENT OF*, and under GENERAL MANAGEMENT in *VEGETABLES: GENERAL CONSIDERATIONS*.

MULCHING MATERIALS. — See *MULCHING*.

MULE PINK (*Dianthus hybridus*).— See *DIANTHUS*.

MULGEDIUM.—Now included in the genus *LACTUCA*.

MULLEIN (*Verbascum*. Nat. Ord. Scrophulariaceæ).—Over a hundred species of Mullein have been described, many of them quite worthless, and of botanical interest only. In the present article we confine ourselves to the Biennial Border Species and Perennial Border Species, omitting the Annuals and Shrubs as being outside the scope of the present work. The common Mullein (*Verbascum Thapsus*) is a useful medicinal plant, and reference should be made to our article on *Medicinal Herbs* for further particulars.

Biennial Border Species.—It is difficult, of course, to advise definitely as to the best varieties when there are so many to choose from, but the following selection of Biennials includes some of the choicest. They are all easily raised from seeds sown in good garden soil in an open position from April to June, and may be treated in the same way as other ordinary hardy biennials.

Verbascum Blattaria.—This bears yellow, or sometimes cream flowers from June to September, and grows 2–4 ft. high.

V. Chaixii. — This useful sort bears yellow flowers from June to September, and grows 1 yd. high.

V. olympicum. — This attractive sort bears golden-yellow flowers throughout the summer,and averages 5–8 ft. high.

V. phlomoides.—This is similar to *V. Chaixii.*

V. rubiginosum.—This is a very attractive sort with yellow flowers deeply tinted with red. It blooms from June to September, and grows 2–4 ft. high.

V. spectabile.—This useful sort bears yellow and purple flowers from June to September, and grows 2 ft. high.

V. Thapsus (Common Mullein).—This is a well-known yellow sort blooming throughout the summer and early autumn, and growing 2–8 ft. high.

Perennial Border Species.—These are of the easiest cultivation in any good garden soil, and are exceedingly suitable for the perennial border, shrub border, or the wild garden. They can easily be increased by division of the roots in the autumn, by cuttings in the summer, and abundantly by seeds sown from March to May. The best time to plant is in March. Of the many sorts that have been described we recommend the following :—

Verbascum cupreum.—A synonym for *V. phoeniceum*, which see.

V. ferrugineum. — This bears flowers of a rusty-brown colour in long spikes from May to August, and grows 1 yd. high.

V. nigrum.— This bears small yellow flowers with purple hairs on the stamens. The long spikes are produced from May to September on plants 2–3 ft. high.

V. orientale.—This is a branching sort, producing yellow flowers in June and July, on plants 2 ft. high.

V. ovalifolium (Syn. *V. formosum*).—This most attractive sort bears large orange flowers from July to September, and grows 1 ft. high.

V. phoeniceum (Syns. *V. cupreum, ferrugineum,* and *puniceum*).—This bears purple flowers on slender stems from May to August, and grows 2–3 ft. high.

V. pinnatifidum (Syn. *V. bipinnatifidum*).—This is the least attractive sort of any described. It bears yellow flowers in scattered clusters during May, and grows about 1½ ft. high.—J. F.

New Varieties.

Verbascum International. — This bears buff-apricot flowers, and grows 6 ft. high.

V. Warley Rose.—This bears rose flowers with chocolate spots and violet stamens, on plants 5 ft. high.

See also *Medicinal Herbs.*

MULLEIN FOXGLOVE (*Digitalis Thapsi*).—See *Foxglove.*

MUME (*Prunus Mume*).—See *Trees.*

MUMMY PEA (*Pisum elatius*). — See *Pisum.*

MUNBYA.—Now included in the genus *Macrotomia.*

MURIATE OF POTASH.—See POTASH MANURES in *MANURES*, and POTASSIUM CHLORIDE in *POTASH AND POTASSIUM COMPOUNDS*.

MUSCARI.—See *GRAPE HYACINTHS*.

MUSHROOM DISEASE.—See *DISEASES OF PLANTS*.

MUSHROOM PESTS.—See *INSECT PESTS*.

MUSHROOM SPAWN : MAKING.

It often happens that one wants to make one's own mushroom spawn, hence the following hints will be useful :—

Collect together a quantity of fresh horse droppings, fresh cow manure, and maiden loam. Weigh up equal proportions of the two manures and one-eighth part of the two of the loam. Break up the droppings with a small fork, spread on them a layer of cow dung and scatter the soil on this. Proceed in the same way till all the manure has been used. Then make a hole in the centre of the heap in the same manner as is done for mixing mortar or concrete (see article on *MORTAR*), and fill with strong liquid manure from the stable yard. Work the heap in exactly the same way as is done in mortar making, but see that the mixture is not made too wet or sloppy. After thorough mixing fill shallow seed boxes previously lined with newspaper with it, and allow to become half-dry. Then insert pieces of spawn (found in heaps of old rotted dung) into the bricks or spawn flags, and place in a warm place for the spawn to work. After a day or two turn out the spawn from the boxes, cut up into convenient-sized bricks, and store in a cool, dry place till required for use.

MUSHROOMS.

The cultivation of these is not nearly as general as it should be, considering how simple it is. Good fresh horse-droppings are the chief essential to successful cultivation, and where a regular supply of these from corn-fed horses can be secured, there is no valid reason why, with a little perseverance, good crops should not be had at all seasons.

Mushrooms may be grown during the winter months in any warm shed or cellar, but during the warmer period of the year, beds made up in a shady spot in the open air will be most likely to give crops of the best quality.

Making the Bed.—Gather the droppings (minus the long straw) from the stables each morning, until sufficient has been obtained to make a bed of the desired size. Perhaps the size most suitable is a bed 4 ft. wide and 6–8 ft. long, allowing a depth which, when fully settled, will not be less than 3 ft., such a bed retaining the necessary heat over a period sufficiently long to ensure the spawn working satisfactorily.

This manure must be laid out thinly under the cover of a shed where rain will not reach it, until sufficient has been got to make a start, after which it should be put into a conical heap to ferment, turning it thoroughly every third morning in order that the very rank steam may escape. After three such turnings the bed may be made.

When making up the bed, should any doubts exist as to quantity of manure being adequate, rather than risk failure the addition of a sixth part good fibrous loam may be made, care being taken to mix this thoroughly with the manure.

The bed should be made moderately firm, but not beaten hard, and as soon as the temperature of the mass, which at first is bound to be pretty high, is reduced almost to 75° F., or 80° F., spawning or planting may be done.

It is most important that the

spawn used should be in a perfectly fresh condition, this being easily ascertained by breaking it in pieces. If a small white thread-like substance is seen to be permeating the whole brick, it will be quite safe to use; but where the mass has the appearance of dried manure the sample should be rejected. Pieces of spawn about the size of a bantam's egg are generally used, burying these about 2 ins. below the surface, at a distance of 6–8 ins. each way.

A few days later cover the bed to a depth of 2 ins. with finely sifted loam, making the surface even, and beating down firmly with the back of a spade. Place a layer of straw or hay over the bed to prevent rapid evaporation of heat and moisture, also to ensure increased warmth should the temperature show signs of dropping too suddenly.

About six weeks later the covering may be carefully removed and the bed examined. If very dry, a slight watering with tepid water may be given, and from this time forward mushrooms may be expected.

Beds in bearing should be frequently syringed overhead and round about, always using tepid water, and after syringing have the covering material replaced.

Pull up all mushrooms as soon as they attain a fair size, in any case before the under side of the specimen gets really black, always filling in the holes thus made with soil or manure.—F. R. C.

[" Spent " beds may frequently be revived by a good soaking of salt water or a solution of nitrate of soda.—EDITOR.]

MUSK (*Mimulus moschatus*).—See *MIMULUS*.

MUSK DAFFODIL (*Narcissus moschatus*).—See *NARCISSUS SPECIES*.

MUSK MALLOW (*Malva moschata*).—See *MALVA*.

MUSK ROSE.—See *ROSE SPECIES*. For the best varieties see *ROSE CLASSES*.

MUSK THISTLE (*Carduus nutans*).—See *CARDUUS*.

MUSSEL SCALE.—See *INSECT PESTS*.

MUSSELS.—See *FISH AS MANURE*.

MUSTARD.—See MEDICINAL HERBS, and see also MUSTARD AND CRESS in *SALAD PLANTS*.

MUTISIA.—For the best species see *CLIMBING AND TRAILING PLANTS*.

MYCORHIZA.

Many plants, including heaths, orchids, and trees belonging to the Natural Orders *Coniferæ* and *Cupuliferæ*, form an association between certain of their rootlets and fungi which is known as *Mycorhiza*. In the case of forest trees the mycorhiza is external, on the roots, and forms a sheath of fungal hyphae round the rootlets, and these hyphae function instead of the root-hairs. In the case of orchids, the fungus is internal; it enters the cells and feeds on the stored starch in the outer layers. In the innermost layers the fungus is subsequently digested and yields food for the host plant. The degree of intimacy between the fungus and the host plants varies greatly in different classes of plants; in orchids and others where the association is very close, seedlings cannot be raised unless the right fungus be present in the soil.—A. D. C.

MYOGALUM.—Now included in the genus ORNITHOGALUM.

MYOSOTIDIUM (Nat. Ord. Boraginaceæ).—One species of this little genus is of considerable importance as a half-hardy herbaceous perennial. This, *M. nobile*, popularly known as the CHATHAM ISLAND FORGET-ME-NOT, bears large blue flowers, the margins of which are white. It flowers in April and May, and grows about 1½ ft. in height. Culture is easy if moist, rich loam is provided in a warm, sunny spot, but in cold districts it should be protected by a covering of straw in the winter. It is best raised by summer-sown seeds.

MYOSOTIS.—This genus is treated under its well-known name *FORGET-ME-NOT*.

MYRIAPODA.—See under MILLEPEDES in *INSECT PESTS*.

MYROBALAN PLUM (*Prunus cerasifera*).—See *TREES*.

MYRRHIS.—See *SWEET CICELY*.

MYRSIPHYLLUM.—See *SMILAX*.

MYRTLE (*Myrtus*. Nat. Ord. Myrtaceæ).—The genus Myrtus is one containing many greenhouse and half-hardy shrubs prized alike for their flowers, foliage, and sweet scent. They thrive in a sharply drained, peaty loam, with leaf-soil added, and are propagated by cuttings. The height averages 5–15 ft.

Culture. — Cuttings of current year's growth, half-matured, will root easily if given a little bottom heat, or kept rather close in a warm house. As the myrtles love a moist, warm atmosphere, the syringe should be freely used throughout the summer months.

USES.—Apart from its ornamental value, the common myrtle is useful economically. A fragrant toilet oil is obtained from the berries, which have also carminative properties, and the leaves and bark are sometimes used for tanning in the East. The plants make handsome wall shrubs in the milder parts of the country, and are useful for subtropical work.

Varieties. — The best are Communis, Luma, tenuifolia, and Ugni.—J. L. G.

See also *SHRUBS*.

MYRTLE GRASS (*Acorus Calamus*).—See under SWEET FLAG in *WATER GARDEN: PLANTS FOR THE*.

MYRTUS.—See *CLIMBING AND TRAILING PLANTS*, *MYRTLE*, and *SHRUBS*.

N

NAPHTHALENE.—See *Soil Fumigating.*

NAPLES GOURD.—See *Ornamental Gourds.*

NARCISSUS BULB FLY.—See *Insect Pests.*

NARCISSUS SPECIES (Nat. Ord. Amaryllidaceæ).—A few notes on some of the best of these may be of interest to bulb enthusiasts. They are all of easy culture and quite hardy, blooming in the spring-time. The height averages 3–18 ins.

Narcissus Backhousei.—This is of garden origin, and has given rise to many varieties. It is a lovely pale yellow or sulphur sort.

N. Barri (Barr's Hybrid Daffodil). — This also is of garden origin, and is available in many varieties. In colour it varies from orange to the palest yellow.

N. biflorus.—This is a pretty white sort worthy of more extensive culture.

N. Bulbocodium (Hoop-Petticoat Daffodil).—This is a very dwarf, early blooming species. The best varieties, ranging in colour from orange to palest lemon yellow, are *citrinus, conspicuus, Craellsii,* and *monophyllus.*

N. Burbidgei.—This is of garden origin, and has given rise to numerous garden varieties. It is a white flower marked red and yellow.

N. cernuus.—This bears pretty pale yellow or white flowers. Its variety *plenus* is difficult to grow.

N. cyclamineus (Cyclamen-flowered Daffodil).—This bears pale yellow flowers with a darker trumpet.

N. gracilis.—This is a tall, yellow species, of which the variety *tenuior* bears pale, almost white flowers.

N. Humei.—This is another sort of garden origin which has given rise to very numerous garden varieties. It bears attractive pale yellow flowers.

N. incomparabilis. — This has given rise to a host of garden varieties, and bears chiefly white or yellow flowers. Its varieties *aurantius plenus,* the popular Orange Phœnix, and *sulphureus plenus,* the well-known Sulphur Phœnix, bear double flowers.

N. intermedius.—This, and its variety *major,* bear light yellow flowers. The variety is the stronger grower.

N. Johnstoni.—This bears attractive flowers of the palest yellow. It has been found useful by hybridists.

N. Jonquilla.— See article on *Jonquils.*

N. juncifolius (Rush-leaved Daffodil). — This is a useful species with rush-like leaves.

N. Leedsii (Leeds' Hybrid Daffodil).—This is of garden origin, and has given rise to a host of varieties. It bears white and yellow flowers.

N. Macleayi.— This, and its varieties *Nelsoni* and *tridymus,* bear white and yellow flowers ; those of the latter emitting a pleasant scent.

N. major.—This is a tall, early flowering daffodil with yellow flowers.

N. maximus.—This is a lovely, large flowered, yellow species which should be grown by all.

N. minor.—As its name implies, this is a dwarf-growing sort. The varieties *minimus* and *nanus* are the best, and bear yellow flowers in the early spring.

N. moschatus (Musk Daffodil). —This is a favourite white species, the flowers of which emit a musk-like scent.

N. muticus.—This is a yellow species which is distinct and useful.

N. odorus (CAMPERNEL).—This is an important species with sweet-scented, yellow flowers. The variety *minor* is known as the SMALL JONQUIL, and *minor plenus* is known by the trade as QUEEN ANNE'S DOUBLE JONQUIL, while *plenus* is popularly called the DOUBLE CAMPERNEL.

N. Poetaz.—This is an important group of hybrids. The best half-dozen are *Aspasia*, *Elvira*, *Ideal*, *Irene*, *Klondyke*, and *Profusion*. These are various shades of white and yellow. The first three and the last are white, with a yellow cup.

N. Poeticus (POET'S DAFFODIL, POET'S NARCISSUS, PHEASANT'S-EYE NARCISSUS, etc.).—This is a very favourite white sort, and has given rise to numerous garden varieties. Some of the best are *ornatus*, *poetarum*, *recurvus*, and *tripodalis*. The first is very useful for early flowering.

N. Pseudo-narcissus (COMMON DAFFODIL).—This and its numerous forms are described in our article on *DAFFODILS*.

N. Tazetta (POLYANTHES DAFFODIL).—A very large number of yellow and white varieties of this are available. Some of the best are *aureus*, *Bertolonii*, *canariensis*, *citrinus*, *Cypri*, *dubius*, *etruscus*, *italicus*, *lacticolor*, *panizzianus*, *papyraceus* (the well-known PAPER WHITE NARCISSUS), *patulus*, *polyanthos*, and *syriacus*.

N. triandrus.—This is the popular ANGEL'S TEARS, with white or yellow flowers in the early spring. The best varieties are *albus*, *concolor*, *pallidulus*, and *pulchellus*.

NARDOSMIA.—Now included in the genus *PETASITES*.

NARDOSTACHYS.—See *SPIKENARD*.

NARDURUS.—Now included in the genus *FESTUCA*.

NARDUS (MAT-WEED. Nat. Ord. Gramineæ).—This is a small genus of hardy grasses quite unworthy of cultivation. *N. stricta* may be seen at Kew.

NARROW-LEAVED SPINDLE TREE (*Euonymus americanus angustifolius*).—See *CLIMBING AND TRAILING PLANTS*.

NARTHEX.—Now included in the genus *FERULA*.

NASTURTIUM (*Tropaeolum*. Nat. Ord. Geraniaceæ).—It is a pity the genus Tropaeolum has received the popular title of Nasturtium, because this name belongs to the Watercress, and Tropaeolum is not more difficult to pronounce or remember than Nasturtium. The two Peruvian species, *T. majus* and *T. minus*, have for a great many years been among the most popular of garden plants. In the hands of florists and hybridists they have been made to produce a wide range of colour varieties, and some with dark, and others with golden, green, or variegated foliage.

Culture.—This is quite a simple matter. Seeds may be sown in gentle heat in March and the seedlings planted 1 ft. apart, but this method is by no means necessary, as seeds sown out of doors in April about 10 ins. apart will provide for an ample display. A sunny position and poor, light soil are necessary to obtain plenty of bloom; in rich, heavy soil foliage is developed at the expense of flowers. The young leaves of *T. majus* and *T. minus* are a useful addition to the salad bowl. The best sorts are :—

Tropaeolum Lobbianum.—This is a handsome climber with ivy-like leafage and flowers ranging from yellow to crimson in colour. Its height is 6 ft. or more.

T. majus (Syns. *T. elatum, T. hybridum, T. quinquelobum, T. repandifolium* and *T. Schillingii*).—This is the popular CLIMBING NASTURTIUM which flowers throughout the summer, and often grows 6–8 ft. high. There are numerous named and colour varieties, the colours ranging from palest buff to the most brilliant scarlet and deep crimson. Some are self-coloured. Others are spotted.

T. minus (Syns. *T. dentatifolium* and *T. pulchellum*).—This is the popular DWARF NASTURTIUM growing 6–15 ins. high. There are variegated and dark-leaved, as well as light and deep green-leaved forms, and the colour range among the flowers is even wider than in the tall growing varieties described in the last paragraph. The *Tom Thumb* strain is very compact. So well have seedsmen selected all the variations that each one comes almost a hundred per cent. true from seeds. The plants bloom with remarkable freedom from July onwards till frost cuts them down.

T. peregrinum (Syns. *T. aduncum, T. canariense,* and *T. Smithii*).—This is the well-known CANARY CREEPER, a climber that is suitable for arches, as it will grow 12 ft. high. Its flowers are small, numerous, and yellow; they are like tiny golden birds ready for flight, and are produced freely throughout the summer.

See also *SALAD PLANTS*, and under TROPAEOLUM in *CLIMBING AND TRAILING PLANTS.*

NATIVE GUANOS.—See *GUANO.*

NATSU GUMI (*Elaeagnus pungens*).—See *CLIMBING AND TRAILING PLANTS* and *SHRUBS.*

NATURAL MANURES.—See *MANURING: PRINCIPLES OF.*

NATURALISING BULBS.

Naturalised bulbs look far more lovely than bulbs grown in any other way, and on account of this form of gardening coming to the fore, we are compelled to devote a few notes to the subject here.

The most suitable site for naturalising bulbs is some lightly shaded woodland glade. Lawns in full view of the house are quite unsuitable, since they cannot be mown till the bulbs have completely died down, and, of course, look somewhat untidy in the later stages.

Provided the soil is fairly light, no special preparation is required. To attempt to plant in any definite-shaped beds or clumps is to mar much of the beauty of the naturalised specimens. Far better to take the bulbs in handfuls and scatter them in all directions, planting them where they fall.

As regards the actual method of planting, if a proper bulb planter (sold by many horticultural firms) is available, by all means use one. If not, use a trowel, lifting the turf, putting in the bulb, replacing the turf and making very firm.

The bigger bulbs in the initial stage of planting should be set about 1 ft. apart to allow for the young bulbs produced to grow up without undue crowding. The smaller bulbs may, of course, be planted much closer up to about 3 ins. apart each way.

Planting of bulbs for naturalising should be done as early as possible. The present writer considers August and September the ideal time, but certainly the work should not be delayed after the end of October, otherwise the bulbs do not get a fair chance to root in the soil before the winter comes on.

It is unnecessary in many cases to purchase new bulbs for naturalising. Those which have been grown in pots or in fibre, those which have been forced, and those used for spring bedding in the borders are all suitable for naturalising. The best mode of procedure is to shake the soil from these, and lay them in at once in the woodland just as they are, with their green tops on as soon as they are finished with. The tops then die down quite naturally, and the bulbs have a splendid start for the following year. Once planted the bulbs should not be disturbed for at least six years, an annual top-dressing of leaf-mould in the autumn being all they require.

As regards suitable bulbs to plant, the range for choice is very great, including all the hardier bulbs. Naturally one avoids naturalising the choicer Lilies and such like, on account of the very noble appearance of these in the flower borders.

E. T. E.

NAUMBURGIA.—Now included in the genus *LYSIMACHIA*, which see.

NAVARRETIA.—Now included in the genus *GILIA*, which see.

NAVELWORT.—A name applied to *OMPHALODES*, which see. It is also applied at times to the genus *COTYLEDON*, popularly known as PENNYWORT.

NECKERIA.—Now included in the genus *CORYDALIS*, which see.

NECTARINE SHOT-HOLE DISEASE. See under PEACH SHOT-HOLE DISEASE in *PEACH DISEASES*.

NECTARINES.—See *PEACHES*.

NECTARINES AND PEACHES: Indoor Culture.—See *PEACHES*.

NECTARINES AND PEACHES: OUTDOOR CULTURE. — To grow Peaches and Nectarines out of doors the protection of a wall or fence is necessary, and for preference one facing south or south-west.

Although they will grow elsewhere, yet to secure perfect well-flavoured fruit the trees need all the sunshine available, and unless attention can be given to cultural details similar to those grown under glass as regards disbudding, thinning, etc., the space afforded them would be much more profitably employed by being devoted to the choicer Pears and Plums.

Nectarines and Peaches are amongst our earliest fruits to flower, and consequently, if exposed, are extremely liable to injury from early spring frosts, therefore some protection is necessary either in the form of a permanent coping, the temporary use of blinds, or some substitute such as a double thickness of fish netting.

If the latter plan is adopted, means must be afforded so that the blinds may be drawn up during the day when the weather conditions are favourable, to allow the blossoms to become perfectly developed and fertilised, either naturally by the bees or artificially by a sharp tap of the trees about the middle of the day or during sunshine when the pollen is dry and flies.

Though the outlay is greater, a permanent peach case or shelter is much the best, and can be erected by the use of iron standards at every 12 ft., connected with a top rail, which should be 9 ins. lower than the top of the wall to allow a good fall to the movable glazed lights, which are supported between the latter and the wall.

A convenient width for the whole structure when complete is 3 ft. The wall, as a saving of labour for years to come, should be wired as close to the stone as possible to give the trees the benefit of the warmth, but leaving sufficient space to allow of the tying material being placed easily and quickly at the back of them. An ideal fitting to the whole is the use of a wooden trellis to walk upon, and the fixing of guttering and down pipes for collecting, and the use of rain water which would otherwise go to waste.

The iron supports may be made use of also for outdoor Tomatoes or for training Cordon Pears or other fruit against; if so, temporary sticks should be affixed to them to prevent the growth coming in contact with the iron. The best of fruit may be obtained under such a structure equal to that grown under cool house treatment, and, generally speaking, with additional advantages, since during the resting period the trees are permanently exposed to the elements, with the exception of the roof covering, though if this last is made in sections, as previously mentioned, it can also be removed, and at no season of the year is the attention of ventilating needed. Perhaps the greatest boon of all is the rendering of the trees practically immune from the attacks of leaf-curl or peach blister.

In a wet, sunless season the trees and fruit are greatly benefited, besides allowing work to be done during wet weather, whilst in hot, dry summer weather the roof may be shaded over to protect the foliage from the scorching rays of the sun. These advantages therefore compensate for the extra labour entailed in watering and syringing, which after all are necessary with those unprotected to secure the best results.

The type of tree usually employed is the dwarf fan-trained. These should be planted 15 ft. apart, and for the first few seasons the most may be made of the space by planting standard fan-trained trees in between.

Exactly the same remarks apply to planting, training, and other cultural details as to those grown under glass, and the quality of the fruits will largely depend upon judicious thinning, feeding, and mulching, also on the exposure of the fruit to the sun. By selecting early mid-season and late varieties a long season is maintained.

With outside trees syringing must be relied upon to combat insect pests, and insecticides properly diluted according to the makers' instructions should be applied when the weather is dull, and preferably towards evening so as to allow the foliage to remain wet for a longer time. Earwigs and woodlice, two disagreeable enemies, have a great dislike to moisture, and frequent syringings of the trees will do much to keep them away. Trapping of these pests may also be carried out by means of short lengths of bean stalks, and small pots filled with dry hay put down at night and emptied in the morning. After a heavy watering, woodlice can often be killed in great numbers crawling up the wall. Birds, wasps, and bees also prove troublesome at times, and necessitate protection by netting tiffany, muslin, etc.—E. B.

NECTAROSCORDUM.—Now included in the genus *ALLIUM*, which see.

NEEDLE, ADAM'S (*Yucca gloriosa*).—See *YUCCA*.

NEEDLE FURZE (*Genista anglica*).—See *SHRUBS*.

NEILLIA.—For the best species see *SHRUBS*.

NEMATUS.—See CURRANT AND GOOSEBERRY SAWFLIES and LARCH SAWFLY in *INSECT PESTS*.

NEMESIA (Nat. Ord. Scrophulariaceæ).—This is a genus of half-hardy annuals, or, more correctly, half-hardy perennials which are treated as half-hardy annuals. They are useful either for summer bedding or for greenhouse decoration. They may be successfully raised by sowing in heat in the usual way for half-hardy plants, but must be well hardened off in a cold frame prior to planting out. The following are the best species of this brilliant genus:—

Nemesia floribunda (Syn. *N. affinis*).—This bears yellow and white flowers from July to August, and averages 12 ins. in height.

N. pubescens.—This is pure white, but otherwise similar to *N. floribunda.*

N. strumosa. — This, and its variety *Suttoni*, are quite the most popular of all with their brilliant scarlet, orange, red, yellow, or many-coloured flowers from the end of June onwards into the autumn, on plants 9–12 ins. high.

UP-TO-DATE SELECTIONS.

Nemesia Large-Flowered Tall.—Many colours.

N. New Dwarf Large-Flowered Rainbow.—Many colours.

N. Dwarf Large-Flowered.—Several shades.

NEMOPHILA (CALIFORNIAN BLUEBELL. Nat. Ord. Hydrophyllaceæ).—*Nemophila insignis* would rank very high if a census were taken with a view to gauging the popularity of hardy annuals, but the other members of the family are not held in such high esteem. An autumn sowing, and also one or two spring sowings are desirable, but thin sowings in light soil, followed by thinning the seedlings to 6–12 ins. apart, are essential if the plants are to develop their full beauty. As a rule they are sown thickly and left unthinned, consequently they remain stunted and soon pass out of bloom. One well-grown plant of *Nemophila insignis* will occupy nearly 9 sq. ins. of ground. We briefly describe the three best species below :—

Nemophila insignis.—This has a blue flower with a white centre, and will bloom freely throughout the summer. There are numerous colour variations offered by seedsmen, and there are large-flowered or grandiflora strains. The foliage is quite elegant, and the plant grows 9–15 ins. high.

N. maculata (Syn. *N. speciosa*).—This is a white sort, with a purple spot on each of the five corolla lobes. The flowers are large for the size of the plant, and are freely produced throughout the summer. The height is 6–8 ins.

N. Menziesii (Syns. *N. atomaria*, *N. auriculaeflora*, *N. crambeoides*, and *N. modesta*).—There are many varieties of this, for example, *alba* is white, with a black centre; *coelestis* is blue and white; *discoidalis* is purple and white; and *oculata* is blue and black. All flower freely from July onwards, and average 9–12 ins. high.

NEOGAYA.—Now included in the genus *LIGUSTICUM.*

NEOTINIA.—Now included in the genus HABENARIA.

NEOTIOPTERIS.—Now included in the genus ASPLENIUM, for which see *FERNS AND FERN GARDENING.*

NEPETA.—See *CATMINT.*

NEPHRODIUM.—For the best species and varieties see *FERNS AND FERN GARDENING.*

NEPHROLEPIS.—For the best species and varieties see *FERNS AND FERN GARDENING.*

NERINES.—See *GUERNSEY LILIES.*

NERTERA (Nat. Ord. Rubiaceæ). *Nertera depressa* (Syn. *N. repens*), popularly known as CORAL-BERRIED DUCKWEED, is frequently offered in nurserymen's catalogues as a desirable subject for edging the border or for the rock garden, with the information that it thrives in sandy loam and leaf-soil. There are, however, many better things. True, its red berries are quite attractive, but both the flowers (which are greenish) and the plants themselves are insignificant, as their height averages only 1–2 ins., and they are thus best excluded where space is precious in favour of choice subjects.

N. depressa is too tender for northern gardens.

NETTING.—See *GARDEN NETTING.*

NETTLE.—See RED DEAD NETTLE and STINGING NETTLE in *WEEDS.*

NETTLE LEAF BELLFLOWER (*Campanula Trachelium*). — See *CAMPANULA.*

NETTLE TREE.—A name applied to the genus CELTIS. See *TREES.*

NEUBECKIA.—Now included in the genus *IRIS.*

NEW ENGLAND STARWORT (*Aster Novae Angliae*).—See *ASTER.*

NEW HOLLAND VIOLET (*Viola hederacea*).—See *VIOLA SPECIES.*

NEW JERSEY TEA (*Ceanothus americanus*).—See *CLIMBING AND TRAILING PLANTS* and *SHRUBS.*

NEW VARIETIES OF PLANTS, 1914–1919. Notes on the best of these are added at the end of the chief Flower, Fruit, and Vegetable articles.

NEW YORK STARWORT (*Aster Novi Belgii*).—See *ASTER.*

NEW ZEALAND BURR. — See *ACAENA.*

NEW ZEALAND FLAX.—See *PHORMIUM.*

NEW ZEALAND SPINACH.—See *SPINACH: NEW ZEALAND,* and *TETRAGONIA.*

NEWCASTLE THORN (*Crataegus Crus-galli*).—See *TREES.*

NEWSPAPER.

This is most valuable to the gardener after the news has been read, and should not be destroyed wholesale as is so often the case. In greenhouses which are only slightly heated, hundreds of plants may be saved from being frosted if a thick layer of newspaper is put over them the night before, and in cold frames this is even more valuable. In the latter case flower sticks should be put in at intervals for the paper to rest upon, and this should be as near the glass as possible. The newspaper can be used over and over again if it is spread out in the sun or in some warm place indoors to dry after use.

NICKAU PALM (*Rhopalostyle Sapida*). See *PALMS.*

NICOTIANA.—See *ANNUALS, HALF-HARDY: LIST OF,* and *TOBACCO PLANT.*

NICOTINE AND SOAP WASH.—See *INSECT PESTS: GENERAL METHODS OF DESTRUCTION.*

NIGELLA.—See *LOVE-IN-A-MIST.*

NIGHT-SCENTED STOCK (*Hesperis.* Nat. Ord. Cruciferæ).—There are twenty annual, biennial, and perennial species of Hesperis, many of them sweet-scented. The plant under notice (*H. tristis*) is the best biennial sort, and may be easily raised by sowing seeds in the open garden in April, May, or June, and transplanting to the border in autumn. It makes a first-class wall plant; its pretty cream, or at times brownish-red or purple flowers, being given from April to August on plants 1–2 ft. high. Another good biennial sort is *Hesperis grandiflora,* which bears white and purple flowers from July onwards on plants 3–4 ft. high, and a third sort sometimes grown is *H. laciniata,* which bears pretty purple flowers in May on plants 2½ ft. high. The ANNUAL SPECIES are hardly worth describing, but the PERENNIAL SPECIES will be found in our article on *ROCKET.*—J. F.

See also *STOCKS: ANNUAL SPECIES.*

NIGHT SOIL.

It always seems to us one of the biggest national sins that Night Soil is not taken more care of than it is. Under the present arrangements, outside water-closets run into ashpits, into which kitchen ashes, by no means free from cinders, are thrown daily by the resident of that house. In due course the ashpit is "full"—in other words, it is up to the level of the gap through which ashes are thrown, and it becomes necessary to have it emptied. A cart calls at midnight and empties this pit, the material of which is fully charged with plant-food, and very often the carter sells the material to some gardener or other for use on his land. This night soil is very often the undoing of the gardener; instead of being good stuff, it is often terrible material, on account of the many sharp fragments of cinder ashes it contains. So the gardener should avoid it, for it will produce scores of scabs in potatoes, parsnips, beet, and other roots, both of a tuberous- and tap-rooted nature.

The proper way of making night soil is to have the closet entirely separated from the ashpit. The closet if outside should on no account be a water-closet, but an earth-closet of the good old-fashioned type. The urinal should be separate, and should run to a cesspool with the drainings from the house. The contents of the pan, which ought, of course, for sanitary reasons to be emptied daily, are very rich as regards food and humus, and provided the earth used is earth in the strictest sense of the word, and entirely distinct from ground grit or ashes, then the material will be of high value as manure. The most convenient way is to form a long, low stack of it in some out-of-the-way part of the garden free from trees, and cover the heap with a good thick layer of earth. After decomposing for a few months, this grand material can be freely used for the vegetable garden, and also in the fruit garden. Four to six cwts. can be used per square rod if put on in the autumn. Any ordinary disinfectant used in the closet will not impair the value of the manure, but may indeed improve it. Probably it is best to avoid applying lime when stacking the night soil, as lime is apt to vaporise the ammonia it contains.—E.

NIGHTSHADE.—See *SOLANUM*, and under BLACK NIGHTSHADE and ENCHANTER'S NIGHTSHADE in *WEEDS*.

NIGRITELLA.—Now included in the genus HABENARIA.

NIKKO SILVER FIR (*Abies homolepis*).—See *TREES*.

NINE-BARK (*Neillia opulifolia*).—See *SHRUBS*.

NINE-LEAVED WOOD SORREL (*Oxalis enneaphylla*).—See *OXALIS*.

NIPHOBOLUS.—Now included in the genus POLYPODIUM, for which see *FERNS AND FERN GARDENING*.

NIPHOPSIS.—Now included in the genus POLYPODIUM, for which see *FERNS AND FERN GARDENING*.

NIT GRASS.—See *GASTRIDIUM*.

NITRATE OF AMMONIA.—See AMMONIUM NITRATE in *AMMONIA AND AMMONIUM COMPOUNDS*.

NITRATE OF CALCIUM.—See CALCIUM NITRATE in *LIME COMPOUNDS*.

NITRATE OF LIME.—See NITROGENOUS MANURES in *MANURES*, and CALCIUM NITRATE in *LIME COMPOUNDS*.

NITRATE OF POTASH.—See NITROGENOUS MANURES in *MANURES*, and POTASSIUM NITRATE in *POTASH AND POTASSIUM COMPOUNDS*.

NITRATE OF SODA.—See NITROGENOUS MANURES in *MANURES*, and SODIUM NITRATE in *SODA AND SODIUM COMPOUNDS*.

NITRE.—See under POTASSIUM NITRATE in *POTASH AND POTASSIUM COMPOUNDS*.

NITRE CAKE.—See SODIUM HYDROGEN SULPHATE and SODIUM SULPHATE in *SODA AND SODIUM COMPOUNDS*.

NITRIC ACID.—See *ACIDS*.

NITRIDE OF CALCIUM.—See CALCIUM NITRIDE in *LIME COMPOUNDS*.

NITRIDE OF LIME.—The same as NITRIDE OF CALCIUM.

NITRO-PHOSPHATES.—Though various forms of these are frequently offered, no such compounds exist from the chemist's point of view. The materials sold are mixtures of nitrates and phosphates, and should be used with caution.

NITRO-PHOSPHORIC ACID.—See *ACIDS.*

NITROGEN.—A few notes on this inert element are given in *CHEMISTRY FOR GARDENERS.*

NITROGENOUS MANURES.—See *MANURES.*

NITROLIM.—See NITROGENOUS MANURES in *MANURES*, and CALCIUM CYANAMIDE in *LIME COMPOUNDS.*

NIVARIA.—Now included in the genus LEUCOJUM.

NOBLE HIMALAYAN LILY (*Lilium giganteum*).—See *LILIES.*

NOCTUIDS.—See SURFACE LARVÆ in *INSECT PESTS.*

NOISETTE ROSE (*Rose noisettiana*).—See *ROSE SPECIES.* For the best varieties see *ROSE CLASSES.*

NOMOCHARIS (Nat. Ord. Liliaceæ).—This is a new genus, a native of China, partaking of the characters of Calochortus, Fritillary, and the Lily. *N. pardanthina* is the only species so far introduced. The flowers, which appear in June, are widely bell-shaped, drooping, and in colour rose, with crimson spots at the base; the outer surface is dark. The leaves are scattered or in whorls, and the height is 1 ft. It is hardy, and will thrive in any well-drained soil, and calls for no special cultural treatment. Propagation is best effected by seeds. The bulbs are used for food by the Chinese.

NON-METALLIC ELEMENTS.—See under OTHER ELEMENTS in *CHEMISTRY FOR GARDENERS.*

NORTH BORDERS: SOME PLANTS FOR.—Many more plants will thrive satisfactorily in a north border than is usually known, though naturally such plants are later in growth and flowering than when placed in more congenial positions. The nature of the background, too, which gives the northerly aspect, has much to do with their development and success. For example, north borders backed by a brick or stone wall will make plants later than if the background were a wood-fence, a shrubbery, or a hedge; and this because, through the latter, some warm air and light will be sure to penetrate to the plants, whereas none is possible through a rigid wall.

But the chief requisite for successful cultivation of plants on a north site is, I am convinced, the nature of the soil. If this is reasonably light, and the border properly drained, artificially, if not naturally, then success can be assured with a fairly large choice of subjects. On the other hand, if the soil is heavy, and sticky in texture, and the position badly drained, it is practically useless to expect those healthy results which gladden the hearts of all really true gardeners. Indeed, money, time, and plants are almost wasted if the rooting medium for plants in any position is unfavourable, but especially is this true when dealing with plants destined to fill northerly situations where a ray of sunshine rarely, if ever, comes. At the same time, it should be remembered that a north border rightly prepared can become the means of prolonging the flowering season of many of our hardy plants.

It may be helpful to beginners to divide the examples now given into two groups—spring flowering and summer flowering.

Spring-Flowering Plants.—Bluebells, Columbines, Crocuses, Fritillaries, Hepaticas, Lily of the Valley, Narcissus—under which name is included the commoner Daffodils—Primulas—especially those of which japonica is representative—Primroses, Saxifrages—the London Pride

(*Saxifraga umbrosa*) being worthy of special mention—and Snowdrops.

Summer - Flowering Plants. — Asters (Michaelmas), *Campanula persicifolia, Eupatorium hirsutum,* Helianthus, Iris (Spanish, and the yellow water Iris), Lupines, Mallows, Musk, *Myosotis palustris*, Spiraeas. All these, once they are established, may be relied upon to succeed, though naturally the date of their flowering will be later than if they were growing in warmer places. The lists are not exhaustive, but they are given as a guide to those whose lot it has not been to glean largely in the field of experience.

In addition to the above there are a few plants for usage which may be termed temporary subjects—plants prepared in pots, usually, to fill up gaps and produce a little extra brightness. A few of such are—among Annuals—Asperula, Candytuft, Viscaria; Ageratums and Calceolarias, these latter enjoying the cool and shade perfectly; Canterbury Bells, whose flowering period is greatly prolonged by the northern aspect, and dwarf blue Lobelias. Of those plants just mentioned, the Lobelia in particular, it is safe to say, is known and thought of as a sun-loving summer bedding plant, yet the writer has had it flower splendidly on a north border, some parts of which were quite untouched by sun.

Hardy Ferns. — Another feature of true permanent worth for north borders is the use of Hardy Ferns. Most natural and pleasing results follow the planting of bulbs between a few Ferns grouped together. It hardly matters which kind of spring blooming bulb one employs for associating with Ferns. The arrangement is bound to satisfy; and by the time the foliage of the bulbs become unsightly, the Fern fronds have developed into a natural screen of such. Hardy Ferns, too, can be used in conjunction with the flowering plants, both being irregularly grouped in lots according to the space at disposal. Deciduous and Evergreen species are available for this purpose.

Climbers.—These, too, have a place in the north border, though the selection is much more restricted when compared with those serviceable for other aspects. Where the background is of shrubs, or a hedge, no climbers are really necessary, but some can be used if wished, and trained to single posts, tripods, or a framework. Should a wall or wooden fence be in existence, the desire for masking will be felt. This can be done with the hardiest climbing Berberises, Cotoneasters, *Crataegus Pyracantha*, Escallonias, *Garrya elliptica*, Ivies, Jasmines, Perennial (Everlasting) Pea, Roses, Virginian Creeper, and, where not too exposed to winds, the hardier Camellias can be tried. Some of these, though not strictly climbers, can be successfully so used when trained. Where it is desired to combine utility—food-value—with beauty, nothing better can be employed than Crab Apples, Morello Cherries, Gooseberries, and Red Currants. Both Cherry and Crab in blossom are a truly grand sight.—C. T.

NORTHERN FOX GRAPE, or FOX GRAPE (*Vitis Labrusca*). — See *CLIMBING AND TRAILING PLANTS*.

NORWAY MAPLE (*Acer platanoides*). See *TREES*.

NORWAY SPRUCE (*Picea excelsa*).—See *TREES*.

NOTCH GRAFTING. — See under GRAFTING in *PROPAGATION OF PLANTS*.

NOTE TAKING. — See *SCHOOL GARDENS*.

NOTEN GUMI (*Elaeagnus pungens*).—See *CLIMBING AND TRAILING PLANTS*.

NOTICE TO QUIT.—See *GARDENING LAW*

NOTIFIABLE DISEASES AND PESTS. — It is remarkable that so few gardeners know that certain diseases and pests which attack their crops are notifiable to the Board of Agriculture at Whitehall Place, London, S.W.1, under penalty of a fine of £10. It is unnecessary to print here the order governing such notification, as copies can be had from the Board's Office, but every gardener should acquaint himself with its provisions if he wishes to steer clear of censure or fines. The following, however, are the names of the notifiable diseases and pests :—

Diseases. — American Gooseberry Mildew, American Pear Blight, Black Knot, Black Scab, Cucumber Canker, Melon Canker, Tomato Leaf Spot, and Wart Disease.

Pests.—Brown Tail Moth, Cherry Fly, Colorado Beetle, Gypsy Moth, Large Larch Sawfly, Mediterranean Fruit Fly, Narcissus Fly, Nun Moth, Potato Moth, San José Scale, and Vine Louse.

The majority of these are described in our articles on *DISEASES OF PLANTS*, *INSECT PESTS*, *POTATO DISEASES*, and *TOMATO DISEASES*. One or two are omitted as they are practically non-existent in England, but should an unfamiliar disease or pest be discovered on any plant a sample should at once be sent to a qualified mycologist or entomologist for examination and report.

[It should be noted that Schedules dealt with under the Destructive Insects and Pests Acts or Orders vary from time to time. Gardeners can, however, always obtain the latest particulars with regard to these orders from the Board's Office. All alterations are, of course, widely advertised.—EDITOR.]

NOTIFIABLE PESTS.—See *NOTIFIABLE DISEASES AND PESTS.*

NOTOBASIS.—Now included in the genus *CNICUS.*

NOTOSPARTIUM.—For best species see *SHRUBS.*

NUPHAR.—See *YELLOW WATER LILY.*

NURSERY AND MARKET GARDENS. See *WOMEN GARDENERS.*

NUT, COMMON.—See under COBNUT, FILBERT, AND HAZEL in *NUT CULTURE.*

NUT CULTURE.

Considering the importance of Nuts as food, the cultivation of the various Nut-producing trees has never received, in this country, the attention it deserves. In nutritive value Nuts take a high place, and in some parts of the world they form a staple article of diet. The Sweet, or Spanish Chestnut, for example, is consumed in great quantities in some parts of the Continent, there being several methods of preparing it for table, one of which is the well-known "polenta," a form of porridge. Until recent times, considerable quantities of all kinds of Nuts were annually imported into Great Britain. It must, of course, be admitted that some kinds, such as the Brazil Nut and the Cocoanut, are altogether unsuited to outdoor cultivation in our climate; while others, such as the Almond and the Spanish Chestnut, though hardy, are uncertain in cropping, unless given conditions favourable to the ripening of their fruits. But even the Cobnut and Filbert, varieties of *Corylus Avellana*, and indigenous to Britain, are in most gardens sadly neglected, rarely producing anything like the crops of which they are capable under good cultivation, while they likewise present a splendid field for experiment at the hands of the hybridist. The following are notes on some of the most important Nut-producing trees :—

Almond, Sweet (*Prunus Amygdalus dulcis*).—The Almond is chiefly grown here as an ornamental tree, and there are numerous varieties. It is one of the first trees to flower early in the year, and in consequence the blossoms are cut off by frost and cold winds, so that it rarely bears fruit. But in a fairly sheltered situation the tree under notice will often ripen its fruits. It will grow in any good soil, well dug, and containing lime. The usual method of propagation is by grafting on the common Plum stock. It reaches a height of about 20 ft., and calls for no special treatment. The Bitter Almond (*P. Amygdalus amara*) fruits under similar conditions.

Barcelona Nut.—See below, under COBNUT, FILBERT, AND HAZEL.

Brazil Nut.—This is produced by *Bertholletia excelsa,* an evergreen tree which, in its native home, reaches a height of 100 ft. In this country it can only be grown in a greenhouse with a winter temperature of 55–60° F. The soil should be a mixture of peat and loam.

Butter Nut.—This is the fruit of *Caryocar nuciferum,* a tropical tree growing 100 ft. high, the culture of which in this country is not possible.

Chestnut.—The edible Chestnut is known as the SWEET or SPANISH CHESTNUT, and botanically as *Castanea sativa.* The HORSE CHESTNUT (*Æsculus Hippocastanum*) is totally unfit for human food, nor will the horse touch it. The Sweet Chestnut makes a very handsome tree, reaching to 50 ft. in height, and the timber is of considerable value. It likes a deep, but by no means heavy loam ; but if Nut production be the object of its cultivation, its root run should be restricted by planting it where the soil is not more than 18–24 ins. deep, with a thick layer of stones or bricks at the bottom. This prevents the formation of tap-roots, and stimulates the growth of fibrous roots, which in their turn lead to a dwarf habit and earlier fruiting. The situation should be warm, and the trees should not be exposed to cold winds from the North. Beyond this, no special treatment is required, and little or no pruning is called for—indeed, pruning means no fruit, the Nuts being borne at the ends of the shoots. There are several varieties, of which *Devonshire, Downton,* and *Prolific* are most grown of British Chestnuts ; of French, *Marron* and *Marron ordinaire* are esteemed, others being *Châtaigne Ancisse, Châtaigne Bois Jaune, Châtaigne Crosnière,* and *Châtaigne Vert de Limousin,* but these are not so suitable for the English climate. They are propagated by grafting on the common Chestnut.

Cobnut, Filbert, and Hazel.—These are all varieties of *Corylus Avellana* and *C. maxima,* to which also belong the BARCELONA NUT or SPANISH NUT. The term COB was formerly given to those Nuts with a short calyx or husk ; while those with a long calyx were known as FILBERTS, supposed to be derived from "full beard," referring to the calyx ; but nowadays, owing to intercrossing, this distinction of naming is not maintained. The HAZEL embraces all forms, including the COMMON NUT or WILD NUT. Almost any soil will suit these trees, but they especially revel in a fairly light loam. Whatever the nature of the soil, it should be deeply dug and well drained. Left to themselves they make dense bushes, throwing up numerous suckers from the base, and bearing little "fruit." With proper training they can be made very productive. The usual method is that known as the Kentish or Maidstone system. This consists in growing the trees on short stems, up to 2 ft. in height, from which a head of six or eight main fruiting branches is formed. These branches are shortened back a third or one-half, and the centre of the bush is kept open, to assume a vase-like form. From the cut-back shoots others will spring, which in turn are shortened the following year, the leading shoots also being shortened. The Nuts will be borne on spurs on the laterals or side branches, and once the trees are formed the pruning will consist in cuttingout those shoots that have fruited, and shortening the growths so that the trees are not more than 6 ft. or so in height. The fruit is borne on ripened shoots of the previous year's growth. All suckers that spring from the base or from the stem must be promptly cut out, also all dead wood and unnecessary twigs. The male and female blossoms are borne separately, the females being small, and scarlet or pink in colour ; the male blossoms are long, soft catkins. These shed their pollen in early spring, and not till after this is done should pruning be attempted—if done too soon, the female blossoms will not be fertilised, and there will be no Nuts. Gathering should not be done till they are fully ripe and brown ; they can then be stored in a dry place or in sand. The BARCELONA NUT is *Corylus maxima barcelonensis*. Of the numerous varieties of Cobnuts and Filberts, the following are among the most popular : *Cosford Cob, Kentish Cob, Duke of Edinburgh, Pearson's Prolific, Red-skinned Filbert, Webb's Prize Cob, and White-skinned Filbert.* Propagation is usually effected by layers, cuttings, and grafting.

Cocoanut.—The fruit of *Cocos nucifera*, an East Indian Palm, reaching 50 ft. in height, and suitable only for greenhouse culture in Britain. [It is also known by the name of COCONUT.—EDITOR.]

Hazel.—See COBNUT, FILBERT, AND HAZEL.

Hickory.—See WALNUT.

Nut, Common. — See COBNUT, FILBERT, AND HAZEL.

Pistachio Nut.—This is the fruit of *Pistacia vera*, which does best on a wall, or on a sheltered south aspect. Male and female blossoms are borne on separate trees, and, when planting, care should be taken that both sexes are represented. A rich loam, deeply worked, is best for this tree. The Nuts grow in clusters. It may be well to point out that this tree so seldom fruits in this country that, if Nuts are the object, it cannot be recommended for general culture. The Nuts require to be cooked to be palatable.

Sweet Almond. — See ALMOND, SWEET.

Walnut. — This, by many regarded as the King of Nuts, is the fruit of *Juglans regia*, a handsome tree,valuable also for its timber. It reaches a great height, and does not commence to bear freely until it attains a good age ; but by special cultivation varieties have been produced of dwarfer habit, which fruit when much younger. It should have a good loamy soil, but does not need shelter, as it is quite hardy. There were at one time many varieties which are now rarely met with, such as *The Yorkshire, Highflyer, Duck Nut, Hâtif*, and *Thin-shelled ; Fertilis* is a more modern, early-fruiting variety. The HICKORY NUT of America (*Carya sp.*) belongs to the same family, the Nuts being distinguished by their smooth shells, which are very hard, and mostly with a small kernel. It requires the same treatment as Juglans.

W. J. C.

NUT GRASS (*Cyperus rotundus*).—See CYPERUS.

NUT PINE (*Pinus sabiniana*).—See *TREES*.

NUT WEEVIL.—See *INSECT PESTS*.

NUTMEG.—A name applied to the genus TORREYA. See *TREES*.

NUTMEG GOURD.—See *ORNAMENTAL GOURDS*.

NUTMEG HICKORY (*Carya myristicaeformis*).—See *TREES*.

NUTTALLIA.—Now included in the genus CALLIRHOË. See also *SHRUBS*.

NYCTERINIA.—See *ANNUALS, HALF-HARDY: LIST OF*.

NYMPHAEA.—See *WATER LILIES*.

NYSSA.—For the best species see *TREES*.

O

OAK.—For best sorts see QUERCUS in *TREES.*

OAK FERN (*Polypodium Dryopteris*). See *FERNS AND FERN GARDENING.*

OAK MILDEW.—See *DISEASES OF PLANTS.*

OAK-TONGUE.—See EDIBLE FUNGI in *FUNGI: EDIBLE AND HARMFUL.*

OAT.—See *AVENA.*

OBLONG WOODSIA (*Woodsia ilvensis*). See *FERNS AND FERN GARDENING.*

OCIMUM (BASIL. Nat. Ord. Labiatæ).—This is a genus chiefly of tender exotic annuals and shrubs suitable for the hothouse. The most important species is *O. Basilicum*, popularly known as BASIL or SWEET BASIL, the culture of which is briefly outlined in our article on *POTHERBS*, which see.

ODONTARRHENA.—Now included in the genus *ALYSSUM.*

ODONTIODA, ODONTOCIDIUM, ODONTOGLOSSUM, and ODONTONIA.—See *ORCHIDS.*

ODONTOSORIA.—Now included in the genus DAVALLIA, for which see *FERNS AND FERN GARDENING.*

ŒNANTHE (WATER DROPWORT. Nat. Ord. Umbelliferæ).—This is a genus of weedy and poisonous plants of no garden value, but dangerous to have about. They are sometimes grown in the wild garden, but might well be dispensed with. *Œ. crocata* (Syn. *Œ. apiifolia*) is the well-known WATER HEMLOCK, the leaves of which omit a violently poisonous juice when crushed; *Œ. peucedanifolia* (Syns. *Œ. silaifolia* of some authorities, and *Œ. Smithii*) is the SULPHUR-WORT; *Œ. Phellandrium* is the HORSEBANE; and *Œ. pimpinelloides* (Syn. *Œ. Lachenalii* of some authorities, not of Grueliy), is the MEADOW PARSLEY.

ŒNOTHERA.—This genus is treated under *EVENING PRIMROSE* and *GODETIA.*

OHIO BUCKEYE (*Æsculus glabra*). —See *TREES.*

OHIO SQUASH.—See *ORNAMENTAL GOURDS.*

OIL OF VITRIOL.—The same as SULPHURIC ACID. See *ACIDS: THEIR USES IN HORTICULTURE.* It is also the same as VITRIOL. See *WEED KILLERS.*

OILEUS.—Now included in genus NARCISSUS. See *NARCISSUS SPECIES.*

OLD BLACK SOILS: IMPROVING.—See *SOIL IMPROVEMENT.*

OLD-FASHIONED FLOWERS.

It is of interest to consider what were the flowers of gardens in the days of our great-grandmothers, or of about a hundred years ago, and to think how charming those gardens must have been, although many of the plants that we now think indispensable were then unknown. From the middle to the end of the eighteenth century there had been in operation that great change in the treatment of pleasure-grounds that involved the inclusion of much larger spaces. In some ways it was a wholesome innovation, for it gave a wider outlook in all senses; but, as with all matters of prevailing fashion, it had regrettable consequences. For there were then existing all over the country the small enclosed gardens of Manor Houses and those belonging to many a modest dwelling of fairly well-to-do people; gardens that had remained unchanged since Jacobean and even Tudor times, but that must now be swept away in obedience to the new fashion of landscape gardening. But a few people were faithful to the old gardens, and to the old garden flowers also, and to this day these remain and retain a special degree of loving appreciation such as we do not extend to the many newcomers, however gorgeous they may be and however well fitted to take their places in our modern pleasure-grounds.

There were then, as now, special fanciers of one kind of flower, so that by long-continued care in breeding or selection better varieties had been obtained; but these examples of what we should call florists' flowers were then confined to very few sorts. If one mentions Auriculas, Carnations, laced Polyanthus, and Tulips, it was about all. Pansies were the next to be taken up. Then, about the middle of the nineteenth century, came the use of tender plants for summer bedding. It was a cruel blow to the old-fashioned flowers, for in many gardens they were either abolished or so little considered that they ceased to count. Happily nothing was absolutely lost, and we have now made up, by restoring them to use, for the neglect of those thirty or forty years when the bedding system was almost exclusively in vogue.

We ask ourselves, Is it the force of old association, or is it that our ancestors had the sense to get hold of the most delightful flowers? We know not; we only feel that what we know as old-fashioned flowers have a kind of charm that makes them more lovable than all the fair plants of more recent introduction. We cannot fail to realise this when we think of a few, such as Honeysuckle, Jasmine, and Moss Rose.

To pass briefly in review, season by season, some of the chief of the old-fashioned flowers—the earliest expected were Snowdrops, then Crocuses, white, purple, and yellow, in lines or patches in flower borders; no one had then thought of the better way we have now lately learnt of having them in grass, nor were they in such numbers of varieties as now. Daffodils also were but few, the one most general in gardens being the old double yellow *Narcissus Telamonius.* Here and there one might find an early form of *N. incomparabilis,* and perhaps a few patches of *N. nanus* and the pretty little *N. minor.* Others were known, such as the good double Queen Anne's Daffodil and the white *N. moschatus*; but they were in special collections only, not in general use. There were the sweet-scented Jonquils, both the true rush-leaved kind and the commoner Campernelle, also the single and double *N. Poeticus.* During January and February there were three good flowering shrubs—Laurustinus, Yellow Jasmine, and, almost more generally than now, the sweet-scented *Daphne Mezereum,* a plant beloved of cottagers, and never seen to greater advantage than in one of those little garden strips between road and cottage that do so much to give beauty and interest to our English roadsides.

In March there was that charming plant Blue-eyed Mary (*Omphalodes verna*), of creeping habit, with leaves of vivid green and pure blue flowers much like Forget-me-not—one of the best of spring flowers and much, too much neglected. Then came double Daisies, red and white, of moderate size, favourite plants for edging, and better in proportion than the modern ones, in which size is greatly overdone. Violets were still of small size; the usual garden kind, known as the Russian Violet, was only a shade larger, if larger at all, than the deliciously scented purple, white and ruddy forms of the wild plant. But there was a double purple Violet, fairly hardy—

that was more fully double than the kinds now grown in frames, the bloom being almost globular—that has now become rare in cultivation. Rosemary, one of the oldest and most favoured of garden shrubs, is in bloom very early in the year; it was in every garden. And there were always two bulbous plants blooming in March or earliest April—the Common Dog's Tooth Violet (*Erythronium*), with its dull pink flowers and beautifully spotted and marbled leaves, and the Purple Fumewort (*Corydalis*), also of a "sad" pinkish colouring of the same class.

Primroses were always favourites, though the singles were in fewer kinds and colourings than now. But the pretty double Primroses, white, yellow, and lilac, were then more grown, and much attention was paid to the laced Polyanthus. Wallflowers were always welcomed, though for a long time there were none but the brown. But there was a capital plant, now only lingering in cultivation and but rarely seen, that was formerly in almost every garden—the perennial double yellow Wallflower. It is a bushy, half-woody plant that goes on for years; just a little tender, and likes to have its back against a warm wall. [This plant is delightful.—EDITOR.]

The end of April brings the Poet's Narcissus, and its still better and later blooming double kind; a flower unsurpassed for beauty and value by any of the more modern Daffodils. With it comes the sweet-scented leafing of Sweetbrier. Crown Anemones will have finished their bloom, but from the end of April to the middle of May Tulips are in full beauty. The kinds are those that have of late years been searched out and restored to favour under the general name of Cottage Tulips, besides the Breeders and Byblœmens of the Dutch, and a number of the flaked and feathered named sorts of the Tulip florists. May also brings Columbines; they were of the short-spurred kinds only, in the purple, white, and dull red colourings in which we still have them. Lily of the Valley and Solomon's Seal were in every garden, though now we plant them by preference in woody places. Pansies were already the subject of special cultivation, though the pretty kinds we now have with frilled edges and rich red colouring were not yet known. Then in May also came the Sweet Rocket, both white and purple. The excellent and still more sweetly scented double Rockets, flowering later, were also old favourites; they are still to be had, though they are no longer in general cultivation. The wealth of Flag Irises that we now have were not available three generations ago; the old blue Flag alone was in every garden, and the grey-white *Iris florentina* was not uncommon. Thrift was prized as an edging plant, also London Pride and the good old white Pink, and for this use we have not found anything better among flowering plants. The white Pink is in fact a better thing than the larger modern kinds that in so many gardens have taken the place of the old favourite, one of whose many merits is its close habit and good silvery foliage in winter. May also brought the grand old double Paeonies, varieties of *P. officinalis*, in three colourings, crimson, deep rose, and pinkish-white; these remain much as they were in the old days. May was always the special month for flowering shrubs, and white Broom, Deutzia, Guelder-rose, Laburnum, Lilac, Ribes, and Syringa were in every garden. Lilacs that have of late years been so greatly improved by the work of French nurserymen were then of two kinds only, namely, white, and the soft light purple that has made "lilac" a colour word. The Honeysuckle that we know as *Early Dutch* was one of the old favourites, and was much used for covering arbours. Another old arbour plant was the Tea-tree or Box Thorn (*Lycium*); still the best thing for forming a neat living shelter. One of the later of the flowering bulbs, the Feathered Hyacinth (*Muscari monstrosum*), was a favoured plant. The aromatic Southernwood (*Artemisia Abrotanum*), though without flower in our climate, should not be forgotten, for it was much prized in cottage gardens, when it was commonly the custom for a spray of it to accompany the prayer-book to church, both being wrapped round in a clean handkerchief.

June brought Day Lilies and the great Orange Lilies, perennial Lupines, Pinks, and Red Valerian (*Centranthus*), with all the old Roses. The Roses, in fact, began in May with the bloom of the Scotch Briers, white, pink, and red, and the clear pink of the early bloom of China Rose. But in June came the Damask Roses, red, and red and white, and the old garden rose nearly related to Damask named *Reine Blanche*, creamy-white, with a narrow edging of red that makes the buds nearly all red. Cabbage Roses too and their crested varieties the Moss Roses; also a number of sorts of the old *Rosa gallica*, nearly all now discarded. There were also a number of Climbing Roses, the Musk Rose and a number of those we knew as Ayrshires, hybrids of *Rosa sempervirens*, many of which are still unbeaten in spite of the large numbers of modern kinds. There were also the Boursaults, Roses without prickles, derived from *Rosa alpina*. One of these, the *Blush Boursault*, has a purity of colouring, of milk-white deepened to a rosy centre, such as no other Rose can show.

With June and July came in the taller of the border Campanulas, *C. latifolia* and *C. persicifolia*, with Canterbury Bells and Sweet Williams, also the rosy Everlasting Pea, the sweet late Dutch Honeysuckle, Monkshoods, both purple and purple and white, several kinds of Stocks, and, above all, Carnations. Of the last, the one most generally grown was the *Old Crimson Clove*, of hardy nature and sweetest scent. There was an old kind something between a Pink and a Carnation called *Anna Boleyn*, in colour soft pink with darker centre, and very sweet. This appears to be lost, as recent inquiries for it have been answered by an assortment of flowers bearing the same name, but in no way equal to the original. Then there was the old kind called *Painted Lady*, with the back of the petals almost scarlet, and so short and stocky in habit that it was difficult to layer. This still exists, but has become rare.

The White Lily (*L. candidum*) was one of the glories of the July garden, as it still remains, for, notwithstanding the introduction of a number of other splendid species, the White Lily, in its stately beauty and purity, always holds its own. The other Lilies of the old gardens were the purple Martagon, two scarlet kinds, *L. chalcedonicum* and *L. pomponium*, the orange *L. croceum*, already mentioned, Tiger Lilies, and the earlier *L. pyrenaicum*, not of any great beauty and with a rank, unpleasant smell.

Lavender was always one of the joys of August, precious for drying and as an ingredient of potpourri, and the same season brought the ever-welcome white Jasmine, a well-deserved favourite of all time. Then came Phloxes, few in number and very poor in quality compared with those of the present day; thin and narrow petalled and of straggling habit. There were also a few Snapdragons of what we should now consider wretched quality, some Dahlias of the old show kinds, and China Asters.

The September show of bloom was not of much account save for the continued flowering of the Dahlias, but there were also French and African Marigolds. Of other annuals there were certain old favourites: Sweet Peas in four sorts only, viz. white, pink and white, purple (light and dark), and the finely splashed mixture that may be called roan. But they were deliciously sweet, a good quality that has been in large measure lost with the improvement of the bloom and the increase of the number of the varieties. These annuals were also commonly grown: the always charming *Collinsia bicolor*, Convolvulus, both tall and dwarf, Cornflowers, blue and purple, Love-in-a-Mist, Mignonette, Nasturtium, and the pretty blue Nemophila, Night-scented Stock, Sweet Sultan, and Virginian Stock. This brief account is by no means an exhaustive description of the resources of the old gardens, but it gives a fair idea of the flowers commonly in use about a hundred years ago.—G. J.

OLD-FASHIONED GARDEN DESIGN. See *GARDEN DESIGN ON OLD-FASHIONED LINES.*

OLD MAN.—See *ARTEMISIA.*

OLD MAN CACTUS (*Pilocereus senilis*).—See *CACTI.*

OLD MAN'S BEARD (*Clematis Vitalba*). See *CLIMBING AND TRAILING PLANTS.*

OLD SCOTCH ROCKET (*Hesperis matronalis*).—See *ROCKET.*

OLEA.—See *OLIVES.*

OLEARIA.—For the best species see *CLIMBING AND TRAILING PLANTS* and *SHRUBS.*

OLEASTER (*Elaeagnus pungens*). — See *CLIMBING AND TRAILING PLANTS.*

OLIVE OIL IN FRUIT BOTTLING.— See *FRUIT BOTTLING AND PRESERVING.*

OLIVES.

Although the genus Olea comprises about thirty species of evergreen trees or shrubs, there is only one which is of general cultivation in England, namely, the COMMON OLIVE, *Olea europaea.* It is usually treated as a greenhouse plant; it will, however, thrive and grow freely out of doors in the warmer parts of Great Britain, such as the south-west of England and parts of Ireland provide. Around London it is quite hardy when planted against a wall, with a south aspect.

Culture.—Olives are among the easiest of plants to cultivate, but whether grown in pots or planted out it is essential they should have a well-drained, loamy soil. They must never be subjected to a very high degree of artificial heat, a temperature of 45° F. in winter being sufficient to keep them in a healthy condition. Propagation may be effected in the spring by means of seeds and cuttings, or by grafting; the latter method is largely practised in countries where they are cultivated extensively for their fruit, but it is only by grafting the special varieties on the wild Olive stock that they are maintained.

In order to secure evenly-balanced, well-shaped trees, it is necessary to prune them carefully. This should be performed in early spring, when the longest branches may be shortened back to within two or three buds of the former year's wood.

The Olive forms a low-branching, evergreen tree, 20–30 ft. high. Its leaves are dark green above and silvery beneath. The flowers are produced in small axillary panicles from wood of the previous year's growth, and appear in June and July. The fruit consists of an oily flesh and a hard kernel, at first of a yellowish-green colour, but turning black when ripe.

From the earliest stages Olives have been cultivated in their native countries Syria and Greece, for the oil which is obtained by pressure from the pulp of the fruit. The quality of the oil differs according to the variety, to the country of growth, also with the care in preparation. As a source of food, and in the cooking of other articles, it is one of the most valuable of all oils; it is also of great use in many industrial processes,being extensively used in the tinning of sardines. In this country its principal use is in the preparation of salads, etc. In Italy and Greece the fresh fruits are used for dessert, whilst unripe Olives appear as a pickle, and they are said to promote digestion. The best oil for the table is from Tuscany, next to it come the Florence and Lucca oils, while the Spanish oil is generally of an inferior quality. Olive Oil is used in medicine, for its nutritious and laxative properties, it is also largely employed in the preparation of ointments. Branches of the Olive have for ages past been regarded as emblems of peace and plenty.—T. W. T.

OMPHALODES (NAVELWORT, etc. Nat. Ord. Boraginaceæ).—All who know and value the beautiful spring flowering *Omphalodes verna* will appreciate its annual relative *O. linifolia,* which is a dainty little plant of easy growth, succeeding in a moist and shady position. Once sown in the spring or early autumn it seeds itself so freely that a succession of plants is easily secured. The white flowers are freely produced in July. The height varies from 6 ins. to 12 ins.

Rock Garden Species.—These are all ow-growing tufted perennials not difficult to establish. Most will thrive in half-shady situations in rich deep soil. They are increased by division in the autumn or spring, also by seeds sown in gentle heat in March.

Omphalodes cornifolia (Syn. *O. cappadocica*).—This has tufts of grey-green leaves. Flowers dark blue, in loose panicles. Site, half-shade. Soil rich leafy. Flowering Period, May to June. Height, 1 ft.

O. Luciliae.—A sort with tufts of glaucous leaves. Flowers pale sky-blue. Site, half-shade. Soil gravelly loam. Flowering Period, June to September. Height, 6 ins.

O. verna (CREEPING FORGET-ME-NOT).—A creeping plant, with deep green rugose foliage. Flowers rich blue, with white eye. Site, half-shade. Soil rich sandy loam. Flowering Period, April to June. Height, 4 ins. Its variety *alba* has pure white flowers.

ONCIDIODA and ONCIDIUM. — See *ORCHIDS.*

ONCOCYCLUS.—Now included in the genus *IRIS.*

ONION (*Allium Cepa.* Nat. Ord. Liliaceæ).—The dawn of the present century witnessed a "boom" in the cultivation of onions, and unlike other booms in the horticultural world, thanks to the usefulness of the crop, each succeeding year has witnessed a large addition to the ranks of Onionists, and to-day the desire to grow bulbs 18 ins. in circumference, weighing from 3 lb. to 4 lb., is not restricted to the professional or trade grower, it being most noticeable that even the merest tyro in kitchen gardening endeavours to secure a good bed of these. Even though the cost of producing these extra large bulbs is very considerable, there is not the slightest doubt as to their being a truly paying crop.

Bulbs half the size of those mentioned above are perhaps the most useful, and, providing the soil and the season are favourable, such may usually be secured with little more trouble than that given to other less useful or important crops.

Site and Soil Preparation.—No matter whether large or medium-sized bulbs are required, the site for the bed should be an open and sunny one, quite away from overhanging trees or shrubs, as bulbs, unless raised in sunny situations, lack both in size and keeping qualities.

A deep root-run is essential, and if the intended bed can be prepared by thorough trenching early in the winter, manure being added on a more liberal scale than for most vegetables, so much the better for the crop, four to six good barrowloads to each square rod forming a liberal dressing. The manure should be well buried.

It should be remembered that, providing the bed is kept free from pests, it may be occupied by onions for an indefinite number of years, each year with better results following: this being so, none need mind the extra trouble and expense the proper preparation of the bed for the first crop involves.

If trenching is decided upon, endeavour to mix a liberal amount of manure with the three spits, enriching the surface with plenty of lime, soot, or wood ashes, and always leaving the surface in a rough state all the winter.

Sowing.—Providing the soil is in a good friable condition, an outdoor sowing may be made any time after the middle of February until as late as the first fortnight of April, but as early sowing usually means early ripening, the sooner the seed is set, the better the bulbs will be ripened in a bad season. A good firm seed-bed is of great importance, and if the soil is made firm previous to sowing, and raked down quite level before drawing the drills, the seed will germinate better, and growth be more even than if the making firm follows the sowing. The distance between the rows should be about 8–12 ins., and they should run north and south. Sow not more than an inch deep, and rake the bed down level with a wooden rake, treading on it as little as possible.

When the plants are well above the soil reduce to not less than 2 ins. apart; the surplus seedlings may either be transplanted or used as a salad. A few weeks later thin them again, leaving them 4 ins. apart, at which distance very serviceable bulbs may be expected.

If what are termed as "boilers" are wanted in quantity, instead of sowing in the open air, sow seed of one of the largest growing varieties in boxes containing a good depth of rich soil, taking care that each seed stands clear of its neighbour. If this is done, and the box stood in a light airy position in the greenhouse, very useful plants should be available for transplanting to open quarters about the middle of April. If these are allowed a foot between the rows, and 8 ins. between the plants, bulbs large enough for most culinary purposes are assured.

For Exhibition.—To grow extra large bulbs, a good strain of a big variety must be secured. To be sure of getting this, buy seed only from the raisers, or firms having a reputation for straightforward dealing. Sow in well-drained boxes not less than 4 ins. deep, filled with rich but porous soil—a too close soil preventing free root action. A compost of equal parts good oak leaf-soil, turfy loam and well-decayed manure is that used by many of our leading growers; this should be passed through a half-inch sieve, afterwards adding about an eighth part of coarse silver sand.

Distribute the seed very evenly, and not less than an inch apart. If sown more thickly than this, the plants grow very weak from the start, or require transferring to other boxes before each have made sufficient roots to enable the transfer being made without serious check to growth. Should pricking out not be decided upon, do the sowing with extra care, and for a few days following keep the soil on the dry side and shade from bright sun. During the early stages of growth seedling onions need very careful watering; cold water must be avoided, also a continual soddened soil, as where this is not guarded against disastrous results often follow.

From the middle of March to April 15th the plants should be stood in a cold frame, quite near the glass, and have abundance of air night and day when conditions are favourable. From the middle to the end of April, the light may be removed entirely or the boxes stood in a sheltered position in the garden until May.

Transplanting into the open bed should be done as early in May as possible. In doing this more than ordinary care should be taken to preserve the roots from injury. Where the plants are growing in boxes, it will be an advantage if one side of these is removed entirely, allowing a trowel or strong label to be placed beneath the drainage and the whole mass gently lifted without unduly disturbing the plants. Others in pots or pans should be knocked out without breaking the ball of soil, and when dividing endeavour to leave as much of this on each plant as possible. Allow not less than 15 ins. between the rows (18 ins. would be even better), and about 12–14 ins. between the plants. Set with a trowel, seeing that the holes are large enough to prevent cramping, and make very firm. Avoid burying more of the stem than is necessary to keep the plant in an upright position, and give a good watering immediately. Frequent syringing overhead is advisable, not only during the first few days after planting, but throughout the whole period of growth.

A month after the plants have become well established, well blacken the soil with old soot, and from the time bulbing commences until the middle of August, a weekly application of Nitrate of Soda or Sulphate of Ammonia, at the rate of an ounce per square yard, should be given. Following the application of the above, failing rain, the bed should be well hoed and if possible receive a thorough watering. On light soils watering is absolutely necessary during the summer months, if large bulbs are to follow, care being taken to give this in sufficient quantity to reach the lowest roots.

Should the summer be dry, and watering not possible, mulch the bed not less than an inch deep with half-decayed manure as soon as the plants show signs of forming bulbs; this will conserve the moisture in the soil, and subsequent rains will wash down plant-food to feed the roots.

Harvest the crop in September, taking care to handle the bulbs of all sizes very carefully, and store under cool conditions, but away from frost. See article *VEGETABLES: HARVESTING AND STORING.*

Good Varieties:— *For General Crop.* — Bedfordshire Champion, Brown Globe, Improved Banbury, James' Long Keeping, Model, Nuneham Park, Reading, Rousham Park, Sutton's A1, Up-to-date, Walker's Exhibition.

For Large Bulbs. — Carter's Record, Cranston's Excelsior, Dickson and Robinson's Premier, Dobbie's Golden Globe, Exhibition, Sutton's A1, Sutton's Ailsa Craig, Sutton's Prizewinner, Webb's Masterpiece.

Pickling Onions.—These are very useful and may be grown in soils of any description with every prospect of success. Sow thickly early in March or April in rows 6 ins. apart, only removing plants where these are very crowded. The variety chiefly sown for this purpose is *Silver Skinned*, but *Carter's Model* is a great improvement on this. Any of those advised for general crop will give good results sown at the distance here mentioned.

Potato Onions (*Allium Cepa aggregatum*).—Although by no means a popular crop with many kitchen gardeners, cottagers and amateurs in some districts find these most interesting and profitable to grow. They have the advantage over ordinary onions of being less trouble to cultivate, and being ready to leave the ground in July, allow ample time for a crop of another kind to follow. The treatment advised in our article on *SHALLOTS* will give equally satisfactory results if followed for these.

Tree Onions (*Allium Cepa proliferum*).—These find but limited favour in many quarters, yet if given good cultivation there is no reason why they should not be as profitable to the grower as are many better known vegetables, particularly in households where much value is placed upon pickles or chutney, the small bulbs being most suitable for this purpose. They may be expected to give good results from land of almost any description, but like all of this family, the richer the soil, the better the results are likely to be. A position in the full sun should always be found for them, and not less than a foot allowed between the rows. It is open to the grower to plant either bulbs borne on the stem, or from the root. Planting should be done in March, and as growth proceeds support must be provided for the stems or many may be broken. As soon as the bulbs are fully ripe, gather them with care and store in a dry room or shed.—F. R. C.

NEW VARIETY.

Autumn Triumph. — The bulbs are as large as a *Giant Rocca*, but unlike that variety keep good until April or May.

ONION DISEASES.

Of such importance to food growers, amateurs, allotment-holders, and professional gardeners alike are Onion Diseases that we think it well to treat them in this separate article rather than include them in the general article on *DISEASES OF PLANTS.* The three diseases described will form good subjects for future research, and those with a taste for pathology would be doing the country a service if they could discover a speedy cure which would obviate the necessity of a lengthy rotation. The onion is a crop of great food value, and the diseases are a serious menace to its successful culture.—EDITOR.

Onion Mildew (*Peronospora Schleideni*).—This Mildew occurs wherever onions are cultivated, and causes damage to the foliage, which hinders the proper swelling of the bulbs. It usually appears in June as a white mould on the leaves, which soon assumes a purplish hue. If the weather is dull and damp, it spreads with great rapidity. More damage is done if mildew comes on early in the season than if it comes on when growth is finished.

REMEDIES.—(1) Dust the plants when wet with dew with black sulphur, or lime and sulphur (1 part lime to 2 parts sulphur), as soon as the disease is noticed, or spray with Burgundy or Bordeaux mixture. (2) Give at least a three-year rotation as the resting spores persist in the soil. (3) Cultivate well, as this assists the plant to withstand mildew. (4) Keep a special watch on autumn-sown onions as these often start the disease.

Onion Smut (*Urocystis cepulae*).—Onion Smut is a serious disease in America, though comparatively rare in this country. It occurs chiefly in spring and early summer and is characterised by the presence of black streaks in the leaves and on the young bulbs. These finally burst open and liberate masses of sooty black spores. The latter fall to the ground, and hence the disease is carried to the soil, where it persists for several years. Leeks are also attacked.

REMEDIES. — Diseased plants should be carefully removed and burned as soon as seen. The selection of a new site and strict attention to clean culture as advocated for Onion White Rot are all that can be recommended.

Onion White Rot or Dry Rot (*Sclerotium cepivorum*).—In this very destructive disease the onion bulbs are attacked at the base by a fungus which forms a copious white mycelium and kills the roots and lower part of the bulbs. Both old and young bulbs are attacked. The fungus later produces minute round black bodies termed *sclerotia*, which are found in plenty on the dead and dying bulbs. These are resting bodies and reproduce the disease. The fungus is difficult to eradicate as the sclerotia retain their vitality for four or five years, and no substance has been discovered which will kill them without injuring the soil.

REMEDIES. — Diseased onions should be lifted at once; sound parts may be used as food, diseased portions should be burned. Onions should not be grown on infected soil for at least five years, and great care should be taken that the new bed is not contaminated with soil or manure from the old bed. Lime dressings have not been found of any avail.—A. D. C.

ONION DRY ROT.—The same as ONION WHITE ROT. See *ONION DISEASES.*

ONION FLY or MAGGOT.—See *INSECT PESTS.*

ONION MILDEW and SMUT.—See *ONION DISEASES.*

ONION TRIBE.—See *KINDS OF CROPS.*

ONION WHITE ROT, or DRY ROT.—See *ONION DISEASES.*

ONISCIDÆ. — See WOODLICE in *INSECT PESTS.*

ONOCLEA.—For the best species and varieties, see *FERNS AND FERN GARDENING.*

ONONIS (REST HARROW. Nat. Ord. Leguminosæ).—This is a large genus containing many hardy and tender annual, biennial, and perennial species. It is unnecessary to describe any here save those which are hardy herbaceous perennials. Some of the dwarfer of these last may be effectively used in the rock garden. All require the ordinary culture usually bestowed on perennials and rock plants, and succeed in common garden soil. They may be propagated by summer sown seeds or root division in the spring, and are best planted about the middle of March. We recommend the following :—

Ononis arvensis.—This is the well-known REST HARROW of the fields—not a very desirable garden plant—which bears purple flowers from June to August, and grows about 12 ins. high.

O. campestris.—Syn. *O. spinosa,* which see.

O. fruticosa.—This is the most popular of all the species, with its pretty pink flowers in May and June on plants 1½–2½ ft. high.

O. Natrix.—The flowers of this desirable species are veined red on yellow ground-work. They are produced from June to August on plants 1½–3 ft. in height.

O. spinosa (Syn. *O. campestris*).—This, and its variety *alba,* bear purple-pink and white flowers respectively from July to August, and average 12 ins. in height.

See also *SHRUBS.*

ONOPORDON (COTTON THISTLE. Nat. Ord. Compositæ).—This is a large genus of weedy, hardy annuals and biennials, the increased culture of which is not to be recommended. The best known species is *O. Acanthium,*the SCOTCH THISTLE, a very troublesome weed in many districts where the soil is on the poor side.

ONOSMA (ALPINE COMFREY. Nat. Ord. Boraginaceæ).—This is a large genus of rock plants requiring a dry position in full sun, and thorough drainage is essential for their success. They are propagated by seeds sown in gentle heat in March, or by cuttings in July. We describe the three best species :—

Onosma albo-roseum.—This has hoary, white leaves on sub-shrubby stems. Flowers white, changing to rose, in racemes. Site sunny. Soil gritty loam. Flowering Period, June. Height, 4 ins.

O. Bourgaei.—This has hoary leaves in tufts. Flowers white and bell-shaped. Site sunny. Soil gritty and stony. Flowering Period, June. Height, 4 ins.

O. echioides (Syn. *O. tauricum*) (GOLDEN DROP).—This has deep-green foliage, and produces narrow leaves in tufts on sub-shrubby stems. Flowers bright yellow. Site sunny. Soil, deep gritty or rock crevice. Flowering Period, May to July. Height, 9 ins.

ONYCHIUM.—For the best species see *FERNS AND FERN GARDENING.*

OPADIA.—See PLUM RED GRUB in *INSECT PESTS.*

OPENINGS FOR WOMEN GARDENERS. — See *WOMEN GARDENERS.*

OPHIOPOGON (SNAKE'S-BEARD. Nat. Ord. Haemodoraceæ).—Three species of this, *O. intermedius, O. Jaburan fol. var.,* and *O. japonicus,* are useful house plants for the home or conservatory, thriving in light loam, to which some peat has been added, the second species having pretty, variegated leaves. All bear yellow flowers from June to August, and average 1–1½ ft. in height. Being half-hardy perennials botanically, they are best propagated by root division in the spring.

OPHIORRHIZA (Nat. Ord. Rubiaceæ).—This plant, of which the English name is SNAKE-ROOT, must not be confused with the hardy Snake-roots of *Liatris* and other genera. It requires greenhouse treatment in light, peaty soil, when it will produce white flowers in August on plants 1 yd. high. It cannot be said to be a plant of much value, though in the olden times it found favour as a remedy for snake-bites.

OPIUM POPPY (*Papaver somniferum*).— See *POPPIES: ANNUAL SPECIES*, and *MEDICINAL HERBS*.

OPOPONAX PLANT (*Opoponax*. Nat. Ord. Umbelliferæ).—Two forms of this plant are sometimes grown in herbaceous borders, or in the wild garden, as hardy herbaceous perennials. These, *O. Chironium* and *O. hispidum* (Syn. *O. orientale*), are both yellow-flowered, and bloom in June, averaging 4–5 ft. in height. They have no special requirements, neither have they any special points of commendation.

OPORANTHUS.—Now included in the genus *STERNBERGIA*.

OPUNTIA.—See *CACTI*.

ORACHE.— See COMMON ORACHE in *WEEDS*.

ORACHE: or Mountain Spinach (*Atriplex hortensis* and *A. h. rubra*. Nat. Ord. Chenopodiaceæ).—This is one of the many plants the leaves of which serve as a substitute for Spinach. It is but little grown by gardeners in this country, excepting as an ornamental plant in the herbaceous border. It usually thrives in districts where ordinary Spinach fails.

Culture.—If an early crop is desired a little seed may be sown in a number of small pots early in March, placing these in a warm greenhouse and reducing the seedlings to one in a single pot soon after germination. Plant out in the open some time in April or early May when there is little danger of frost. The first outdoor sowing should not be made before the end of March, further sowings following at intervals of a few weeks throughout the summer and early autumn.

Sow in drills from 18 ins. to 2 ft. apart, and quite early in growth reduce the seedlings to 15 ins. apart in the row.

On rich soil the plant grows very quickly, and if a fair crop is to be taken from each plant, the importance of constant soil stirring, together with the systematic gathering of the leaves, should not be minimised, for even when grown under the most favourable conditions, the plant quickly forms flower spikes, after which the quantity of leaves produced suitable for culinary purposes is very limited; in fact, wherever possible sufficient rows should always be coming on to allow those showing signs of running to seed to be destroyed as soon as flowers appear.

F. R. C.

See also *ATRIPLEX*.

ORANGE BALL TREE (*Buddleia globosa*).— See *CLIMBING AND TRAILING PLANTS* and *SHRUBS*.

ORANGE DAISY (*Erigeron aurantiacus*).—See *ERIGERON*.

ORANGE PHŒNIX (*Narcissus incomparabilis aurantius plenus*).— See *NARCISSUS SPECIES*.

ORANGE SUNFLOWER.— See *HELIOPSIS*.

ORCHARD HOUSE: MANAGEMENT OF.—The most suitable structure for an orchard house is one with a span roof, about 20 ft. wide, 5 ft. in height to the eaves, 10–12 ft. to the ridge, with spacious running ventilators on either side top and bottom, and having a central bed 7 ft. wide, surrounded by walls 2 ft. high, with beds arranged on either side of the house each 3 ft. 6 ins. wide, with similar walls. These beds should be filled in with any material suitable or plunging the pot trees in; or if the trees are to be planted out in the beds, put in the bottom 6–9 ins. of broken bricks, etc., for drainage,—on this lay turves grass-side downwards, and fill in with good chopped fibrous loam, with old mortar rubble, charcoal, and bonemeal mixed in with it, in which plant the trees. Growing the trees in pots is much to be preferred to planting them out, as they are more under control and can be removed after the fruit is gathered, into the open for the winter months and derive much benefit therefrom.

Housing the Pot Trees.—Obviously the trees must be brought in before the flower-buds burst; this generally has to be done quite early in March, as by then Apricots, Nectarines, Peaches, and Plums are getting advanced. Plunge the pots to the rims in the beds, making them level and firm; arrange each different variety in separate groups, placing the Cherries on the shady side of the house, and putting Peaches and Nectarines where they will get the most light.

Ventilation.—Considering the inmates are all hardy fruits revelling in full light and air, it would be unnatural to coddle them, and this must not be attempted. Maintain a circulation of air continuously night and day, but avoid opening the bottom ventilators, which will admit gusts of cold air, while biting north or east winds are blowing in the early spring. If ventilation is not thorough, mildew will soon attack the young and tender foliage.

Fertilising.—To ensure an even set, assist the dispersion of the pollen artificially. When the flowers are fully expanded, brush them lightly over with a rabbit's tail, or fine-hair brush, about midday on sunny days. The atmosphere surrounding the trees in flower must be kept dry.

Syringing.—To keep the trees healthy and free from insect pests, syringe them twice daily on all fine days, commencing to do so as soon as they have passed out of flower, continuing right up to the time signs of the fruit ripening are observed. Should green or black fly appear, spray the trees with Quassia Extract, or some other safe insecticide, immediately it is noted.

Stopping and Thinning.—As pot trees are usually grown in bush or pyramid form, fruiting spurs must be encouraged to develop; this is done by pinching back the young lateral growths to about three joints while quite young, repeating the operation later when other growths are produced, allowing the leading shoots on the main branches to go unrestricted. Thinning the fruits must be done gradually, leaving the final thinning of all stone-fruits until after the stoning period is over; Apples and Pears may, however, be thinned directly the young fruits are seen to be swelling freely. Overcropping leads to exhausted trees and under-sized fruits.

Watering and Feeding.—These are the most important details connected with the orchard house. Trees must never lack moisture at the roots at any time. Early in the season they do not require much water, but need a lot more as the season advances. They will want watering four and five times a day during the summer. Feeding should be done regularly and systematically, commencing at first while the fruits are quite small with weak soot water, or liquid manure, at each alternate watering; later, supplement this once a week with a surface dressing of artificial manure, washing it in with clear water, gradually increasing the quantity as time goes on.

The placing of zinc collars around the top of the pots enables top-dressings of chopped loam, intermixed with bonemeal, soot, and artificial manure occasionally to be applied.

The Ripening Period.—This extends over several months, commencing with early Cherries, finishing with late Plums and Pears. With a view to enhancing both colour and flavour of ripening fruits, expose them to all the light possible at this period. Apples and Pears must be tied on with raffia to secure them from falling. Wasps should be excluded by stretching wasp netting over the ventilators. Directly the trees are cleared of their crop move them outside, shading them at first from full sunlight to prevent the foliage scorching, but directly they become inured, sink them in the plunging ground, giving full attention to watering still.

Re-potting.—Directly the foliage changes colour in the autumn the trees should all be re-potted. In doing this, turn them out of their pots, and remove every bit of the old soil it is possible to work away from their roots. It will then be found that most trees will go back easily into the same size pots; occasionally an extra vigorous tree will require a larger size, but be sure never to overpot, the secret of success being to have the pots well filled with roots. A compost consisting of good fibrous loam, old mortar rubble, charcoal, and bonemeal will be found suitable. Take care while potting to get the soil well home; work it in by degrees, forcing it down with a thin rammer, and make it very firm. After potting return the trees to the plunging ground, and water them in.

Pruning. — Shorten back any young wood, removing all except two or three fruiting buds on the spurs and the extension shoots to two-thirds of their length, as soon as the leaves have fallen.

VARIETIES TO GROW.

APPLES.—Suitable varieties for the Orchard House are: *Beauty of Bath, Charles Ross, Cox's Orange Pippin, James Grieve, King of the Pippins, Peasgood's Nonsuch, Ribston Pippin, Rival, Wealthy, Worcester Pearmain.*

APRICOTS. — *New Large Early, Moorpark, Oullin's Early.*

CHERRIES.—*Early Lyons, Early Rivers, Elton, Emperor Francis, Frogmore, Governor Wood, Mayduke.*

FIGS. — *Brown Turkey, Negro Largo, White Ischia.*

NECTARINES. — *Dryden, Early Rivers, Elruge, Humboldt, Lord Napier, Pineapple.*

PEACHES. — *Bellegarde, Crimson Galande, Duchess of Cornwall, Duke of York, Peregrine, Sea Eagle, Stirling Castle.*

PEARS.—*Clapp's Favourite, Conference, Doyenné du Comice, Le Lectier, Marguerite Marrillat, Marie Louise, Triomphe de Vienne.*

PLUMS.—*Coe's Golden Drop, Coe's Violet, Jefferson, Kirke's Belle de Louvain, Oullin's Golden Gage, Pond's Seedling, Primate, Reine Claude de Bavay.*—T. B. F.

ORCHARD TREES: ARRANGEMENT OF.— See *ORCHARDS: MAKING AND MANAGEMENT OF.*

ORCHARDS: ASPECT FOR. — See *ORCHARDS: MAKING AND MANAGEMENT OF.*

ORCHARDS: DRAINAGE FOR.— See *ORCHARDS: MAKING AND MANAGEMENT OF.*

ORCHARDS: MAKING AND MANAGEMENT OF.—After many years' practical experience of hardy fruit culture, and the opportunities afforded of examining the methods of other growers, the writer's conclusion is that there must be a radical change in the cultivation and management of Orchards, if they are to be the true success they might be. More attention should be paid to details, and with a system of careful culture, a judicious selection of varieties to suit the soil, district, and markets there is a great future for the fruit growers of this country.

Aspect. — When selecting a site for an Orchard, the essential considerations are, aspect and soil. Some form of shelter is necessary from cutting winds or late spring frosts, and if no natural shelter exists, the difficulty may be overcome by planting on the windward side a belt of deciduous and evergreen trees. The ideal site is a gentle slope with a south aspect, well sheltered from other quarters, and high enough to miss the spring frosts, but not too elevated to be exposed to the north and east winds. The soil may not be so deep as in the lower or flat ground, but the quality, flavour, and colour of the fruit will be much finer, through being naturally more exposed to the sun and air.

Soil.—This is next in importance to shelter. Most soils by good treatment can be made to produce first-class fruit. Soils and subsoils vary considerably, and undoubtedly a good heavy loam of a greasy or retentive nature, resting on a clay subsoil, is the best.

It may be possible to obtain satisfactory results for a few years on shallow soils resting on a subsoil of gravel and rock, but not for long, since the roots in course of time penetrate the uncongenial lower stratum in search of food, and then the trees commence to canker and eventually die. Some of the finest *Cox's Orange Pippin* apples the writer ever saw were grown on ground with a subsoil of gravel, but the superstratum of excellent soil ran to a great depth. Very rarely does this happen, for usually subsoils of gravel or rock carry very shallow surface soils of inferior quality.

Drainage. — When the site is selected, drainage should be the first consideration, and whatever the condition of the soil may be, it is most essential that the land is efficiently drained. Stone drains are preferable to pipes in the writer's opinion. They should be set in rows 25 ft. apart, and buried at least 3 ft. in depth. Such drains serve the purpose admirably, and never get out of order. The land must be properly prepared—all new ground should be trenched 2 ft. deep, and the bottom of each trench turned over a spade's depth, and broken up, but not brought to the surface. If the work is commenced in the autumn or winter, it is advisable to delay planting until the following autumn, cropping the ground the following summer with potatoes, giving the seed plenty of space so that the soil can be freely cultivated. This will not only improve the crop of potatoes, but bring the soil into excellent condition for planting the trees in the autumn.

Planting. — The best time for planting all Orchard trees is from the end of October to the end of November. The soil being still warm at that period, the trees commence root action at once before the cold weather sets in. Presuming it is intended to lay the Orchard down in grass, standard trees should carry stems at least 5 ft. in length, so that the branches are beyond the reach of cattle.

Particular attention should be given to staking the trees and protecting the stems securely. As regards the distance at which the trees should stand from each other, it is very important that ample space be allowed for the admission of sun and air.

Standard Orchard trees should be

planted from 15 ft. to 25 ft. apart, the latter distance for preference, if the intervening spaces are cropped with vegetables for several years, which is advisable. To produce these vegetable crops, the soil has to be heavily manured and well cultivated, but the crops leave it in a splendid condition for the roots of the trees, when they have been established long enough to take advantage of it, namely, in about five years. The soil should then be levelled, rolled firm, and sown with grass seeds.

Arrangement of Trees.—Whether the trees are planted in squares or triangles, is a matter for the grower to decide, although planting in squares is strongly recommended, especially for Orchards on a large scale. This method facilitates the work of the horse cultivator, the carting of manure, and other work usually done by horse power. Standard trees should not be planted on a large scale, unless it is the intention eventually to sow the land with grass for grazing purposes. Bush trees are greatly preferable. They can be planted closer than standards; moreover, the work of spraying, pruning, and gathering the fruit is carried out with greater dispatch. Bush trees also come into bearing much sooner, and if they do not carry quite such heavy crops, this is more than repaid by the extra trees. Then the intervening spaces may be utilised for planting bush fruits such as Gooseberries, Raspberries, and Strawberries. The trees should not be allowed to carry much fruit for a few years, it being more essential to encourage growth and vigour by severely thinning the fruits.

Lime for Stone Fruits.—Calcareous loams are the best soils for all stone fruits, because they contain lime, and where this is deficient the soil should be corrected by a liberal dressing of old mortar rubble or slaked lime, in preference to any one of the widely advertised proprietary limes which are really of little use. This should be lightly forked into the ground previous to planting.

Mulching.—This matter is of some importance to the grower of Orchard fruit trees. The writer's opinion is that a light surface mulching of short stable litter should be placed round each tree after planting, to serve the dual purpose of protecting the roots from injury by frost in winter, and of retaining the moisture in dry summer weather. [We prefer not to mulch at planting time as the food in the manure cannot then be used.—EDITOR.] At a later period, when the trees are established and in fruiting condition, much heavier mulchings may be applied. Decayed vegetable refuse, soot, wood ashes, turf edgings, and half-rotted manure, all well incorporated some weeks in advance, form the best dressing for fruit trees. They not only encourage the young fibres to come to the surface, but impart colour to the fruit, and show a marked improvement in the foliage, especially after a heavy shower.

Weeding.—This also is important work for Orchard Gardeners. The surface soil should be kept scrupulously clean and free from all forms of wild plants. There is no better method of eradicating these harbours of insect pests than the frequent use of the hoe. It is impossible to exaggerate the importance of hoeing, to prevent rapid evaporation of moisture that takes place in hot weather.

Diseases.—The most destructive fungoid diseases with which the fruit grower has to contend are *Bladosporium dentriticum* on Pears, and Brown Rot (*Monilia fructigena*) on Apples. The latter attacks Apples, Cherries, Peaches, Pears, and Plums, but it is more in evidence on Apples and Pears. The disease first attacks the foliage, but is usually noticed when it appears on the young fruit, in small brown spots, gradually increasing in size until the whole fruit is affected. The fungus spreads rapidly, and if neglected the young growths and fruit spurs become affected and covered with spores which mature during April and May. Carefully collect and burn all affected fruit, also the shoots when pruning. No cure is yet known, but preventive measures should be taken by spraying the trees when the leaf-buds are expanding with very weak Bordeaux Mixture, repeating the operation at intervals. [Other Diseases will be found in our articles on *Apple Diseases*, *Diseases of Plants*, etc.—Editor.]

Pests.—The Winter Moth, the Great Winter Moth, the March Moth, and the Codling Moth are the most destructive and troublesome of Orchard Insects. These are dealt with in the article on *Insect Pests*, which includes also Woolly Aphis (American Blight), Mussel Scale, Green and Black Aphis, Apple Blossom Weevil, and the Pear Midge. As soon as an attack is observed immediate steps must be taken to exterminate the pests, or great damage may be done.

Varieties.—The experienced grower is the best judge of varieties which suit any particular district, and the amateur will do well to study local conditions, including the soil, ere he makes a selection. However, there are very few soils in which the varieties named in our articles on each individual fruit will not thrive and give an abundant crop for all purposes.—W. J. G.

[It will be noticed that our contributor assumes that Orchards are to be sown with grass seed, but we should like to urge the wisdom of omitting the practice when circumstances allow. We are well aware of the happy associations connected with Orchards laid down in grass; our boys and girls love their games in the Orchard; a walk in a grass-laid Orchard in the spring when the trees are in full bloom has been said to be as near heavenly loveliness as it is possible on this earth to be; and lovers would be sorry indeed if Orchards were no longer laid down in grass; but even so it must be pointed out that grass has its disadvantages. It is so apt to get coarse, and then it will help to starve the trees, and rob their roots of air and warmth as well. Likewise it harbours millions of pests unless well looked after. We hope that new Orchards will be planted as described, but the soil left without the sowing of grass. Such would assist the trees greatly and keep them cleaner and more healthy, we feel sure. There would, however, be no objection to the planting of a few vegetables on the vacant ground beneath the trees, provided that only surface rooting crops were used.—Editor.]

ORCHID BORER.—See *Insect Pests.*

ORCHID HOUSE: Management of. Orchids as grown under glass in England comprise plants found in different countries and at different altitudes, hence the necessity of having houses maintained at different temperatures where a comprehensive collection has to be accommodated.

Orchids are divided into classes, namely, Warm, Intermediate, and Cool, and the respective houses are known by these names. The majority of Orchids known in our collections to-day, both species and hybrids, can be successfully cultivated in one or other of the houses named; but satisfactory results cannot be attained by attempting all classes of Orchids in one house.

Cool house Orchids comprise at the present day some of the most beautiful plants in cultivation. They are very popular, and rightly so, as their beauties may be enjoyed without subjecting oneself to the, at times, uncomfortable temperatures of the warmer divisions. The old-time idea, that Orchids are difficult plants to grow, is an utter fallacy, and once the rudiments of their culture are mastered, there is no reason why anyone with the proper convenience should fail to grow them satisfactorily.

All plants grown by the artificial methods of glasshouses depend entirely upon the conditions provided for them, hence the necessity of paying strict attention to the details of temperature, atmospheric moisture, ventilation and shading, which make up the general routine of Orchid House Management. Watering and potting, although having some relation to the matter mentioned, are outside my province in this article, and are treated in the article *ORCHIDS: POTTING AND WATERING OF*. To simplify matters I propose to divide the year into two seasons: the spring and summer we will call the growing season; the autumn and winter the resting season. Rest is an absolute necessity to plant life, just as much as it is to the individual who attempts Orchid cultivation, hence the reason for keeping everything quiet or resting during the dull dark days of winter.

Temperatures.—The following temperatures may be regarded as averages; slight fluctuations will do no harm, but every effort should be made to keep the temperatures as steady as possible, since drastic changes are most harmful.

WARM HOUSE.—During the spring and summer months a temperature of 65–70° by night, and 70–80° by day, rising even higher with sunshine. In the autumn and winter 60–65° by night, and 65–70° by day. Warm House Orchids include: Ærides, Angræcum, Dendrobium, Phalænopsis, and Vanda.

THE INTERMEDIATE HOUSE.—This should be kept during summer at 60–65° by night, and 65–70° by day. During winter 55–60° by night, and 60–65° by day. Orchids for this House include: Cattleyas, Coelogynes, Brassocattleya, Cypripediums, Dendrobiums, Lælias, Læliocattleya, Miltonia, Oncidiums, Pleiones, etc.

THE COOL HOUSE.—This should be kept as near 60° as possible by day, and 55° by night during the summer season. In winter the night temperature may fall to 45° without injuring the plants; but 50° is the proper figure, and the temperature should be increased to 55° or 57° during the day. In this house may be grown many Orchids, chief among which may be named: Masdevallias, Nanodes, Odontiodas, Odontoglossums, and Oncidiums.

All the temperatures given are Fahr.

Atmospheric Moisture.—This is used to counteract the drying influences of the hot-water pipes necessary to heat the different houses, and to produce humid growing conditions, whilst the plants are making their growth, also to prevent attacks of insect pests, whilst the plants are at rest.

The paths, walls, and stages of the different houses should be damped with a syringe or water-pot two or three times a day, according to the outside conditions, and this is called "damping down." The general principle to be followed is: the greater the amount of heat, from whatever source, the greater amount of moisture is necessary. In the growing season a more humid atmosphere is desirable than when the plants are at rest. During hot weather the plants may be syringed or sprayed once or twice a day with clean soft water, which must be the same temperature as the house.

The chief atmospheric conditions to avoid are: a low temperature heavily charged with moisture; and a hot, dry temperature; both are the forerunner of disease and disaster.

Ventilation.—As nearly all Orchids come from hilly and mountainous countries, fresh air is indispensable to them, and should be admitted on all favourable occasions, particularly in the cooler divisions.

In the warm house with its higher temperature, though quite as beneficial to the plants, air cannot be so freely admitted, as a sudden lowering of the temperature may do much harm. Top ventilation must not be used to the extent of allowing the atmospheric moisture to escape too rapidly.

Air is best admitted chiefly through the bottom ventilators, which should be placed in the walls of the houses; the air, coming in contact thereby with the heat of the pipes, is warmed before reaching the plants. Fresh air should be admitted also during the night whenever the outside conditions will allow.

A proper balance of heat, light, air and moisture must be maintained at all times according to the season of the year.

Light being a great factor in successful plant culture indoors, the glass should be kept clean at all times.

Shading.—Although all Orchids appreciate light, they are not able to stand strong sunshine or the direct rays of the sun; therefore, some means must be provided to protect them.

Wood lath blinds raised some 12 ins. from the roof answer the purpose better than any other material, and at the same time allow a current of air to pass between the blind and the roof, keeping the intense heat back and enabling an even temperature to be maintained.

Whatever material is used, it is better to be left in position all through the summer season, and should be so arranged as to be easily run up and down. In a changeable climate such as we have in Britain, a command over the shading is a distinct advantage to, and often an essential to the success of the Orchid cultivator.

J. T. B.

ORCHID SPOT DISEASE.—See *DISEASES OF PLANTS.*

ORCHID: Water Garden Species.—See *WATER GARDEN: PLANTS FOR THE.*

ORCHIDS.

Acineta.—Plants of stout habit, with slightly furrowed bulbs, bearing large plicate leaves. Flowers produced in drooping racemes from base of bulb. Natives of Tropical America and Mexico.

A. Barkeri.—Large flowers, golden-yellow, lip spotted dark red; summer. Height, 18–24 ins.

A. densa.—A beautiful species; sepals bright yellow, petals crimson-spotted, lip-marked with deep red; spring. Height, 12–18 ins.

A. Humboldtii.—Flowers chocolate-purple, petals rose, pendent spikes 2 ft. long; spring. Height, 12–18 ins.

Ada.—Represented in gardens by *A. aurantiaca*, a neat plant bearing erect spikes of cinnabar-orange flowers produced in late winter and spring. Native of Colombia. Height, 1 ft.

Ærides.—A genus of evergreen plants, with erect stems on which the foliage is arranged distichously. Flowers borne in pendent racemes, of wax-like texture, often scented. Natives of India, Malay Archipelago, and Eastern Asia.

A. affine.—Flowers rose, lip with darker spots; summer. Height, 10–20 ins.

A. crispum.—Flowers scented, white, rose-tipped, lip rose-purple; summer. Height, 2–5 ft.

A. Lawrenceæ.—Very handsome, large flowers waxy-white, tipped with purple; autumn.

A. maculosum.—Branched racemes of fragrant flowers, light-rose, purple spotted; summer.

A. odoratum.—Flowers creamy-white, marked with magenta; summer. Height, 2–4 ft.

A. Sanderianum.—Very showy, spike 2 ft., creamy-white, magenta marked; summer. Height, 1–4 ft.

A. virens.—Fragrant, flowers whitish, marked with purple; summer. Height, 1–3 ft.

Angræcum.—Remarkable epiphytes with opposite foliage, from the axils of which the flowers are produced. The long slender spur to the lip is a noteworthy feature. Natives of Tropical Africa and Madagascar.

A. citratum.—Neat habit, flowers creamy-white, borne on arching spikes; summer.

A. eburneum.—Leaves stiff, about 18 ins. long, flowers large, pure white; summer. Height, 1–3 ft.

A. infundibulare.—Elegant and rare, broad lip of flower pure white, the long funnel-shaped spur pale green; summer.

A. Kotschyi.—Many flowered pendulous racemes, creamy-white, very long spur red-brown; autumn.

A. Sanderianum.—Stems, 10–15 ins., drooping scapes of pure white flowers; summer.

A. sesquipedale.—Flowers very large, ivory-white, spur about a foot long; winter. Height, 1–3 ft.

Anguloa.—Large handsome-flowered plants producing cradle-shaped, fleshy flowers from the base of the bulb. The broad leaves plicate and erect, from 18–24 ins. high. Natives of Colombia.

A. Cliftonii.—Sepals and petals lemon-yellow with dark purple base, lip brownish-yellow; spring.

A. Clowesii.—Fragrant flowers, golden-yellow, lip whitish; spring.

A. eburnea.—Sepals and petals pure white, lip slightly pink-spotted; spring.

A. Ruckeri.—Sepals and petals yellow, crimson-spotted, lip crimson; summer.

A. uniflora.—Flowers white, flushed with pink; summer.

Ansellia.—Noble plants, producing large panicles of flowers. Natives of Tropical Africa and Natal.

A. africana.—Flower spike borne from apex of bulb, yellow, spotted with red; winter. Height, 3 ft.

Arachnanthe. — Closely allied to VANDA. Stems leafy, bearing loose racemes of showy flowers. Natives of Malay Archipelago.

A. Cathcartii. — Tall scrambling habit, flowers large and fleshy, yellowish, banded with red, lip white; summer.

A. Lowii.—Flowers produced on spikes which are often 12 ft. long, yellowish, blotched with chocolate-red; autumn. Height, 2–10 ft.

Arpophyllum.—A small genus with slender bulbs and narrow leaves. The numerous flowers are produced in dense, cylindrical racemes. Natives of Mexico and Central America.

A. giganteum.—Flowers rose-purple, spike about 12 ins. long; spring. Height, 20–36 ins.

Bifrenaria. — Allied to MAXILLARIA. Bulbs usually stout, angled, rather pointed, bearing stiff leaves. Natives of Brazil and British Guiana.

B. aurantiaca.—Flowers in racemes, yellow, orange spotted; autumn and winter. Height, 6–9 ins.

B. Harrisoniæ. — Flowers large, ochreous yellow, scented; spring. Height, 6–9 ins.

Brassavola. — Comprising about a dozen species. Bulbs flat or cylindrical, and bearing fleshy leaves. Flowers produced on apex of bulb. Natives of Central and Tropical America.

B. Digbyana.—Bulbs about 6 ins. high, bearing a fleshy leaf, flower large, greenish-white, lip broad and deeply fringed; autumn.

B. glauca. — Neat habit, flowers white, shaded with green; spring.

B. nodosa. — Flower white, lip spreading; autumn. Height, about 12 ins.

Brassia.—Resembling the genus Oncidium, but differing in the narrow, very elongated sepals and petals. The species inhabit Tropical America, Brazil, and the West Indies.

B. maculata.—Spikes, 9–18 ins. long, flowers light yellow, brown spotted; spring. Height, 9–12 ins.

B. verrucosa.— Spikes about 2 ft. long, flowers greenish, blotched with dark purple. Height, 9–15 ins.

Brassocattleya. — Derived through the intercrossing of the genera Brassavola and Cattleya. By using *Brassavola Digbyana* many elegant and attractive flowers have been produced, the main distinguishing feature being the unusually large and prettily fringed labellum.

Brassolælia. — Obtained by uniting the genera Brassavola and Lælia. Many excellent hybrids have resulted when *Brassavola Digbyana* has been one of the parents.

Brassolæliocattleya. — A combination of the genera Brassavola, Lælia, and Cattleya; numerous hybrids in this section have been produced, the flowers generally being remarkably attractive when *Brassavola Digbyana* is included.

Broughtonia.—This genus is usually represented in gardens by *B. sanguinea*, of compact habit, roundish bulbs, from the apex of which the arched panicles of blood-coloured flowers are produced; summer.

Bulbophyllum.—A genus of widely distributed and curious plants, chiefly of botanical interest and requiring warm treatment.

B. barbigerum.—Dwarf habit, small bulbs, the spike carrying about eight flowers, the lip like a tuft of hair, so delicate that it moves with the slightest breath, which gives it the appearance of a living thing; spring and summer.

B. Lobbii.—Flowers comparatively large, buff-yellow, the upper sepal marked with purple; summer.

Calanthe.—Terrestrial plants divided into two sections — evergreen and deciduous, the latter being more largely cultivated. Flower spikes produced from base of bulb.

C. masuca.—Evergreen, height 20–30 ins., flowers deep violet and purplish; summer.

C. rosea.—Deciduous, typically rose-pink, but varying; winter.

C. veratrifolia.—Evergreen, flowers white, lip deeply cut; summer.

C. vestita. — Deciduous, flowers creamy-white, sometimes with a coloured eye; winter.

Calanthe Hybrids. — Numerous and useful, the best known being *Sedenii* (Veitchii × vestita), and *Veitchii* (rosea × vestita). *C. Dominyi* (furcata × masuca) is of interest as being the first Orchid hybrid artificially raised.

Cattleya. — A most important and popular genus, dedicated to Wm. Cattleya, who died in 1832. Flowers large, showy, produced on apex of the bulbs, and in the bud state protected by a sheath. Natives of Tropical America.

C. amethystoglossa.—Bulbs 1½–3 ft.

high, flowers light rose, purple spotted, lip magenta-purple ; spring.

C. bicolor.—Bulbs slender, 15–20 ins. high, flowers bronzy-green, lip rose-purple ; late summer.

C. Bowringiana.—Stems 9–18 ins. high, swollen at base, spikes of rose-purple ; autumn.

C. citrina. — Dwarf habit, bulbs globular, flowers pendent, bright yellow, fragrant ; spring.

C. Dowiana.—Bulbs club-shaped, flowers nankeen-yellow, lip crimson-purple, streaked with gold ; autumn.

C. Eldorado.—Bulbs round, smooth, flowers blush-white, lip purplish-magenta ; early summer.

C. Gaskelliana.—Bulbs club-shaped, flowers rose-flushed, lip amethyst-purple ; late summer.

C. granulosa.—Stems terete, two-leaved, 15–30 ins. high, flowers olive-green, lip white and crimson ; late summer.

C. Harrisoniana.—Bulbs slender, 12–24 ins. high, flowers rose-lilac ; summer.

C. intermedia.—Bulbs slender, 10–20 ins. high, flowers rose, lip purple ; summer.

C. labiata.—Bulbs club-shaped, 6–10 ins. high, flowers deep rose, lip crimson-purple ; late autumn.

C. Lawrenceana.—Bulbs 12–15 ins. high, flowers rose-purple ; spring.

C. Leopoldii.—Bulbs 1½–3 ft. high, flowers bronze, lip crimson-purple ; summer.

C. Loddigesii.—Bulbs slender, 12–24 ins. high, flowers lilac-rose ; late summer.

C. Luddemanniana.—Bulbs thick, flowers light rosy-purple, lip amethyst and white ; summer.

C. maxima.—Flowers rose, lip veined dark crimson ; winter. Height, about 15 ins.

C. Mendelii.—Large flowers, blush-rose, lip rich magenta ; early summer.

C. Mossiæ. — Flowers large and variable, light rose, lip crimson and rose with yellow markings ; early summer.

C. Percivaliana.—Flowers of medium size, deep rose, lip richly coloured ; early winter.

C. Rex.—Flowers creamy-white to yellow, lip crimson ; summer.

C. Schilleriana.—Flowers large, rosy-brown, lip striped with purple ; summer.

C. Schroderæ.—Bulbs club-shaped, flowers light rose, deeper on lip ; spring.

S. Skinneri.—Stems 9–18 ins. high, flowers rose-purple ; early summer.

C. Trianæ.—Flowers large, blush, lip purple-crimson ; early spring.

C. Warneri. — Flowers large, deep rose, lip rich crimson ; summer.

C. Warscewiczii. — Flowers very large, dark rose, lip broad, magenta-purple ; summer.

Cattleya Hybrids.—Of the numerous hybrids in this genus the most useful are :—

Adula (bicolor × Hardyana) ; *Atalanta* (Leopoldii × Warscewiczii) ; *Empress Frederick* (Mossiæ × Dowiana aurea) ; *Fabia* (labiata × Dowiana aurea) ; *Hardyana* (Warscewiczii × Dowiana aurea) ; *iridescens* (bicolor × Eldorado) ; *Iris* (bicolor × Dowiana aurea) ; *Lord Rothschild* (Gaskelliana × Dowiana aurea) ; *Maggie Raphael* (Dowiana aurea × Trianæ alba) ; *Mantinii* (Bowringiana × Dowiana aurea) ; *Octave Doin* (Mendelii × Dowiana aurea) ; *Portia* (Bowringiana × labiata) ; *Sybil* (iridescens × Dowiana aurea) ; *Tityus* (Enid × Octave Doin) ; and *Venus* (Iris × Dowiana aurea).

Chysis. — Deciduous, with stout, fleshy bulbs about a foot in height, and broad lanceolate leaves. Flowers carried on short racemes produced from the young growths.

C. aurea.—Sepals and petals yellow, lip tawny, marked with crimson ; early summer.

C. bractescens.—Sepals and petals white, lip yellowish, with crimson markings ; spring.

C. lævis.—Sepals and petals orange-yellow, lip yellow, crimson blotched ; early summer.

Cirrhopetalum. — An interesting genus, dwarf habit, the inflorescence usually umbel-like, the lateral sepals considerably developed. Allied to BULBOPHYLLUM.

C. Medusæ.—Apex of spike producing a dense cluster of small creamy flowers.

C. picturatum.—Flowers yellowish-green, upper sepal red spotted ; autumn.

C. robustum.—Robust, flowers large, glossy, yellow, lip chocolate-red ; summer.

C. Rothschildianum.—Flowers 5 ins. long, dark red-purple, with traces of yellow ; autumn.

Cochlioda. — Allied to ODONTOGLOSSUM, noteworthy on account of the various meritorious hybrids produced by *C. Nœtzliana.* Natives of Peru and Ecuador.

C. Nœtzliana. — Habit dwarf, flowers rich orange-scarlet; winter and spring.

C. rosea. — Flowers rose-carmine, column white; winter.

C. sanguinea.—Flowers rose-pink, lip paler; autumn.

C. vulcanica.—Erect spikes of dark rose flowers, lip paler; spring.

Cœlia.—Bulbs globose, with two or three narrow leaves. Flowers produced on erect spikes from base of bulb. Natives of South America.

C. bella.—Flowers large, creamy-white, tipped with magenta, lip yellow; autumn.

C. macrostachya.—Flowers rose-red, in tall, erect spikes; late summer.

Cœlogyne.—A useful genus widely distributed throughout the East, *C. cristata* being one of the most popular Orchids cultivated. Flowers usually produced from the young growths.

C. barbata.—Spike erect, flowers pure white, lip bearded with brown hairs; winter.

C. cristata.—Racemes of pure white flowers, centre of lip orange-yellow; winter to spring.

C. Dayana.—Scapes pendent, 2–3 ft., flowers ochre-yellow, lip white and chocolate; early summer.

C. flaccida.—Drooping racemes of whitish flowers, lip with yellow disc; spring.

C. pandurata.—Bulbs set widely apart, flowers large, greenish, lip warted, blotched with black; summer.

C. Sanderæ.—Erect spike of whitish flowers, orange blotch on lip; summer.

C. speciosa.—Flowers large, tawny, lip yellow outside, brown within; various.

Colax.—A small genus related to LYCASTE and MAXILLARIA.

C. jugosus. — Bulbs 2–3 ins. high, leaves 6–9 ins., flowers white, marked with purple; early summer. Native of Brazil.

Coryanthes.—Remarkable for the extraordinary structure of the flowers, part of which is in the form of a pouch so arranged as to catch a secretion dropped by two lobes at the base of the column. Natives of Tropical South America.

C. macrantha.—Flowers rich yellow, speckled with red; summer.

C. maculata.—Flowers light yellow, spotted with crimson; summer.

Cycnoches.—Stems thick and fleshy, 6–10 ins. high, bearing three or four large leaves, which decay when the bulbs are completed. On account of the long, slender, arching column the flowers resemble the Swan, from which the generic name is derived.

C. chlorochilon. — Flowers large, yellowish-green, lip white, with blackish blotch at base; summer.

Cymbidium.—A popular genus with short, stout bulbs sheathed with long, narrow foliage. The erect or semi-pendent spikes are produced from the base of the bulb, and carry numerous flowers. During recent years the hybridist has added many beautiful novelties.

C. eburneum.—Spikes one to three flowered, ivory-white, centre of lip yellow; winter and early spring.

C. giganteum.—Spikes with seven to fifteen flowers, large, yellowish-green, striped with red; winter.

C. grandiflorum. — Flowers large, sepals and petals green, lip yellow, marked with crimson-purple; winter and spring.

C. insigne.—Spike 3–4 ft. long, carrying many flowers, light rose, lip marked with rose-purple; spring.

C. Lowianum.—Spikes long, fifteen to thirty flowers, yellowish-green, lip with crimson blotch; early spring.

C. Parishii.—Erect spikes of three to five flowers, ivory-white, lip blotched with crimson-purple; spring.

C. tigrinum.—Dwarf habit, spikes drooping, flowers olive-green, lip marked with purple; autumn.

C. Tracyanum. — Flowers large, yellowish, lip marked with crimson; summer.

C. Wilsonii.—Spike slender, about five flowers, light green, lip yellowish, marked with red-brown; late winter.

Cymbidium Hybrids.—The following selection embraces the finest hybrids:—*Alexanderi* (eburneo-Lowianum × insigne); *Doris* (insigne × Tracyanum); *Lady Colman* (eburneo-Lowianum × Tracyanum); *Pauwelsii* (insigne × Lowianum); *rosefieldense* (grandiflorum × Tracyanum); *Schlegelii* (insigne × Wiganianum); *Wiganianum* (eburneum × Tracyanum); and *Woodhamsianum* (eburneo-Lowianum × Lowianum).

Cyperorchis. — These plants are allied to, and often included in, the genus CYMBIDIUM, but differ in having the segments of the flowers more or less united at their basal halves, and hence do not open so fully.

C. elegans. — Racemes sub-erect, flowers closely set, straw-yellow; autumn.

C. Mastersii.—Spikes erect, flowers ivory-white, lip rose-spotted; winter.

Cypripedium.—A well-known and largely cultivated terrestrial genus containing numerous species and a multitude of hybrids. Many have variegated foliage, while the handsome dorsal sepal and the singular pouch-like lip render them ever attractive.

C. barbatum.—Foliage tessellated, dorsal sepal white, flushed and striped with purple; summer.

C. bellatulum.—Leaves tessellated, flowers white, spotted with dull purple; summer.

C. Boxallii.—A dark variety of *C. villosum.*

C. callosum. — Leaves marbled, dorsal sepal white, green at base, striped with crimson; spring and summer.

C. Chamberlainianum.—Leaves dark green, dorsal sepal with rose markings, petals twisted; various.

C. Charlesworthii.—Leaves narrow, green, dorsal sepal broad, rose, with darker veining; late summer.

C. concolor. — Leaves marbled, flowers light yellow, speckled with crimson; early summer.

C. Curtisii. — Foliage tessellated, flowers bold, dorsal sepal greenish, with darker veining; spring and summer.

C. Fairrieanum. — Leaves green, dorsal sepal white, veined with purple, petals deflexed; summer.

C. hirsutissimum.—Leaves green, flowers large, dorsal sepal dark purplish-green; spring.

C. insigne.—Leaves green, dorsal sepal green, with brown-purple spots, apex white; winter.

C. Lawrenceanum.—Foliage tessellated, flowers large, dorsal sepal white, with purplish veins; early summer.

C. niveum.—Habit dwarf, flowers satiny-white, round in outline; summer.

C. Rothschildianum.—Leaves about 2 ft. in length, dorsal sepal yellowish, with black stripes, petals horizontal and long; summer.

C. Spicerianum. — Leaves green, dorsal sepal white, with median purple stripe; winter.

C. Stonei.—Leaves green, dorsal sepal white, striped with blackish-crimson, petals 5 ins. long; autumn.

C. superbiens.—Foliage tessellated, dorsal sepal whitish, green veined; summer.

C. tonsum. — Foliage tessellated, dorsal sepal greenish, with darker veining; autumn.

C. venustum. — Foliage mottled, dorsal sepal greenish-white, with purple stripes; spring.

C. villosum.—Foliage green, flowers large, glossy, dorsal sepal brown and green; early spring.

Cypripedium Hybrids. — Of the immense number of hybrids raised in gardens the following are among the most useful:—

Actæus (insigne × Leeanum); *Arthurianum* (insigne × Fairrieanum); *aureum* (nitens × Spicerianum); *Draco* (Hera × insigne); *Helen II* (bellatulum × insigne); *Hera* (Boxallii × Leeanum); *Lathamianum* (Spicerianum × villosum); *Leander* (Leeanum × villosum); *Leeanum* (insigne × Spicerianum); *Leoniæ* (callosum × insigne); *Lord Wolmer* (Hera × Leeanum); *Mons. de Curte* (Boxallii × insigne); *Morganiæ* (Stonei × superbiens); *nitens* (insigne × villosum); *picturatum* (Spicerianum × superbiens); *Priam* (insigne × Niobe); *Psyche* (bellatulum × niveum); *Rossettii* (insigne × Maudiæ); *Tracyanum* (aureum × Leeanum); *Troilus* (insigne × nitens); and *W. R. Lee* (Rothschildianum × superbiens).

Cyrtopodium. — Handsome plants with tall bulbs, having long, strap-shaped leaves. Flower spike tall and branching, produced from base of bulb.

C. Andersonii.—Stems 3–4 ft. high, spike taller, flowers yellowish tinged with green; spring.

C. punctatum.—Stems 2–3 ft. high, flowers yellow, marked with red; spring.

Dendrobium.—A large genus distributed throughout the East, from India, through Burma, Assam, and to the Philippines and Australia. Bulbs vary from three inches to several feet high. Flowers produced in clusters of two or three from the nodes of the bulb, as in *D. nobile*; on erect apical spikes, as in *D. phalænopsis*; and in drooping apical clusters, as in *D. densiflorum.*

D. acuminatum. — Bulbs small, quadrangular, spike from apex, flowers rose-purple; late winter.

D. atroviolaceum.—Flowers in terminal spikes, creamy-white, spotted with purple; winter.

D. aureum.—Flowers from nodes, fragrant, amber, lip marked with brown; early spring.

D. bigibbum.—Flowers in terminal spikes, magenta-purple; late autumn.

D. Brymerianum.—Flowers large, in

short racemes, golden, lip deeply fringed; spring.

D. crassinode. — Stems knotted, flowers from nodes, white tipped with purple; late winter.

D. Dearei.—Flowers from apex, in clusters, large, white; early autumn.

D. densiflorum.—Bulbs stout, flowers in dense pendulous trusses, yellowish; spring.

D. Falconeri. — Stems knotted, flowers from nodes, white tipped with purple; spring.

D. fimbriatum.—Flowers in pendulous racemes, orange-yellow, lip fimbriated; spring.

D. formosum.—Bulbs black-haired, flowers in apical clusters, large, white; autumn.

D. infundibulum. — Stems black-haired, flowers in apical clusters, white; spring and summer.

D. Jamesianum. — Stems black-haired, flowers in apical clusters, white, lip marked with cinnabar; spring and summer.

D. macrophyllum. — Stems stout, flowers in terminal spikes, yellowish, lip marked with purple; summer.

D. nobile.—Flowers from nodes, whitish, tipped with rose-purple, lip blotched; spring.

D. phalænopsis. — Flowers in terminal spikes, deep rose; autumn.

D. Pierardii.—Stems slender, pendent, flowers from nodes, blush-white, lip purple-veined; spring.

D. Sanderæ.—Stems tall, racemes on upper part, flowers white, lip lined with green; early autumn.

D. speciosum. — Stems stout, flowers in terminal spikes, pale yellow; spring.

D. suavissimum. — Stems stout, flowers in terminal racemes, golden-yellow, lip blotched; spring.

D. superbum. — Stems pendent, flowers from nodes, magenta-rose; spring.

D. thyrsiflorum.—Stems thick, flowers in drooping thyrses, whitish, lip orange; spring.

D. Victoria Regina.—Flowers from nodes, whitish, outer portions purplish-blue; autumn.

D. Wardianum. — Stems stout, flowers from nodes, waxy-white, tipped with amethyst purple; spring.

Dendrobium Hybrids.—The following are all worthy of cultivation :—

Ainsworthii (aureum × nobile); *chessingtonense* (aureum × Wiganiæ); *Euryalus* (Ainsworthii × nobile); *melanodiscus* (Findlayanum × Ainsworthii); *Ophir* (signatum × aureum); *Schneiderianum* (Findlayanum × aureum); *Thwaitesiæ* (Ainsworthii × Wiganiæ); *Venus* (nobile × Falconeri); *Wiganiæ* (signatum × nobile); and *Wiganianum* (Hildebrandii × nobile).

Disa.—Terrestrial plants with tuberous roots, producing leafy, erect flower spikes from their centre. Natives of South Africa.

D. grandiflora.—Flower stem tall, large, scarlet; spring and summer.

D. racemosa.—Flower stem with many blooms of rose-purple; summer.

D. Veitchii.—Garden-raised hybrid between grandiflora and racemosa.

Epicattleya.—Garden-raised hybrids between the two genera Epidendrum and Cattleya.

Epidendrum. — A large genus, variable as to habit, size, and shape of the flowers. The majority are only of botanical interest.

E. cochleatum.—Spike erect, flowers greenish, lip shell-shaped, blackish; various.

E. fragrans.—Scapes short, erect, flowers creamy, lip streaked with red-purple; late summer.

E. nemorale. — Spike branching, flowers large, rosy-mauve; summer.

E. prismatocarpum.—Spikes erect, flowers cream-yellow, blotched with purple; summer.

E. radicans.—Stems long, slender, producing aerial roots, flowers orange-scarlet; various.

E. vitellinum.—Bulbs ovoid, flowers cinnabar-red; autumn.

Epilælia. — Garden-raised hybrids between Epidendrum and Lælia.

Epiphronitis. — Garden-raised hybrids between Epidendrum and Sophronitis, generally represented by *E. Veitchii* (E. radicans × S. grandiflora).

Eulophia.—Terrestrial plants, widely distributed, represented in gardens by *E. guineensis*, which has pear-shaped bulbs bearing large, plicate, deciduous leaves; flowers purplish-green, lip white, striped with crimson; summer.

Eulophiella. — Handsome plants, natives of Madagascar, and represented in gardens by the following ;—

E. Elizabethæ.—Bulbs at intervals on rhizomes, leaves narrow, spikes 1–2 ft. long, flowers fleshy, white; spring.

E. Peetersiana.—Habit much larger than above, spikes 3–5 ft. high, flowers 3–4 ins. across, rose-purple; spring.

Grammatophyllum. — Robust epiphytes, flowers from long scapes, produced from base of bulb, which vary considerably in size.

G. Fenzlianum.—Bulbs short, stout, flowers yellow and green, blotched with chocolate; summer.

G. multiflorum. — Bulbs short, flowers brownish-purple, lip yellowish, streaked with chocolate; summer.

G. speciosum.—Bulbs 4–10 ft. high, spike 5 ft. long or more, flowers yellow, blotched with purple; various.

Habenaria. — Terrestrial, tuberous rooted, deciduous and widely distributed. Foliage grows in a rosette-like form, the leafy flower spike produced from the centre.

H. carnea.—Spike 1 ft., flowers flesh coloured, lip deeply cleft; autumn.

H. rhodocheila.—Flowers medium size, lip vermilion; summer. Height, 6–12 ins.

H. Susannæ.—Flowers large, pure white, lip three-lobed; autumn. Height, 18–36 ins.

Houlletia. — A small genus, bulb bearing a single, large, plicate leaf, and producing from its base an erect spike of six to twelve flowers.

H. Brocklehurstiana.—Spike 12–24 ins. high, flowers chocolate brown, lip yellow, spotted; summer.

H. odoratissima.—Of smaller habit than the above, flowers brownish-red, lip tipped with yellow; summer.

Lælia.—A genus of pretty Orchids, differing from Cattleya by having eight pollinia instead of four. Natives of Mexico and Brazil.

L. albida.—Bulbs ovate, spikes five to eight flowered, white, lip rose flushed; winter.

L. anceps. — Bulbs 3–6 ins. high, spikes tall, flowers rose-lilac, lip crimson-purple. There are many varieties, some with white segments.

L. autumnalis.—Bulbs 2–4 ins. high, tall spikes of rose-purple flowers; late autumn.

L. cinnabarina.—Bulbs 6–9 ins. high, erect spikes of cinnabar-red flowers; spring.

L. crispa. — Bulbs 6–12 ins. high, flowers large, whitish, lip crisped; summer.

L. flava.—Bulbs 3–6 ins. high, erect spikes of canary-yellow flowers; summer.

L. Jongheana.—Bulbs short, flowers large, rose-purple, lip with yellow ridges; early spring.

L. pumila.—Habit dwarf, flowers large, rose-purple, lip purplish-crimson; autumn.

L. purpurata.—Bulbs with leaf 20–30 ins. high, flowers large, rose-white lip crimson-purple; spring.

L. superbiens.—Bulbs 10–15 ins. high, two-leaved, spikes long, flowers deep-rose, lip crimson; winter.

L. tenebrosa. — Flowers reddish-brown, lip dusky purple; spring.

Læliocattleya.—A very popular and numerous section obtained by crossing the various species of Lælia and Cattleya. No less than 1500 different crosses have been named. The best include:—

Aphrodite (C. Mendelii × L. purpurata); *Baroness Schroder* (L. Jongheana × C. Trianæ); *bella* (C. labiata × L. purpurata); *bletchleyensis* (C. Warscewiczii × L. tenebrosa); *callistoglossa* (C. Warscewiczii × L. purpurata); *Canhamiana* (C. Mossiæ × L. purpurata); *Dominiana* (C. Dowiana × L. purpurata); *elegans* (C. Leopoldii × L. purpurata); *Epicasta* (L. pumila × C. Warscewiczii); *Fascinator* (C. Schroderæ × L. purpurata); *Golden Glory* (C. Mossiæ × L.-C. Zephyr); *Haroldiana* (C. Hardyana × L. tenebrosa); *Henry Greenwood* (C. Hardyana × L.-C. Schilleriana); *Martinetii* (C. Mossiæ × L. tenebrosa); *Ophir* (C. Dowiana × L. xanthina); *St. Gothard* (C. Hardyana × L.-C. Gottoiana); *Thyone* (L. C. Ophir × C. Dowiana aurea); and *Wellsiana* (L. purpurata × C. Trianæ).

Lowiara.—A combination of the genera Brassavola, Lælia, and Sophronitis, the first raised being *L. insignis* (B.-L. Helen × S. grandiflora).

Lycaste.—A popular genus of easy culture, for the most part natives of Central America. Characterised by stout, ovoid bulbs bearing plicate leaves.

L. aromatica.—Habit dwarf, flowers golden-yellow; winter.

L. cruenta.—Habit dwarf, flowers yellow, lip blotched; spring.

L. Deppei.—Flowers large, sepals green, petals white, lip yellow, red spotted; winter.

L. gigantea.—Bulbs and flowers large, olive-green, lip purplish; winter.

L. macrophylla. — Flowers large, sepals olive-green, shaded red, petals white, rose-spotted late winter.

L. Skinneri.—Flowers large, handsome, light rose, petals darker, lip whitish, crimson spotted; winter.

Masdevallia.—An interesting genus of small tufted plants devoid of bulbs, natives of South America. The sepals are the prominent part of the flower usually extending into a tail-like form.

M. Chimæra.—Flowers large, variable, yellowish, thickly spotted with reddish-purple; spring and summer.

M. Harryana. — Flowers blood-crimson, many varieties; spring.

M. ignea.—Flowers large, cinnabar-red; spring.

M. polysticta.—Flowers white, purple spotted; spring.

M. Schroderiana. — Handsome flowers, rose-purple and white, long yellow tails; summer.

Maxillaria. — Widely distributed throughout Central America. Bulbs comparatively small, producing single flowered scapes from the base. While some species have short rhizomes and clustering bulbs, others have ascending rhizomes with the bulbs farther apart.

M. grandiflora.—Large flowers, milk-white, lip yellow, marked with crimson; spring.

M. luteo-alba.—Flowers large, white and tawny-yellow; various.

M. Sanderiana.—Flowers about 6 ins. across, white, marked with blood-red; spring.

M. tenuifolia.—Bulbs at intervals on ascending rhizome, leaves narrow, flowers reddish, marked with yellow; spring.

M. venusta.—Flowers large, white, lip yellow; winter.

Miltonia.—Large flowered epiphytes, producing flower spikes from base of bulb. Natives of Brazil and Colombia.

M. phalænopsis.—Leaves narrow, spikes of rose-white flowers, lip blotched with purple; late spring.

M. spectabilis.—Bulbs at intervals on rhizome, flowers rose, broad lip, purple; summer.

M. vexillaria.—Bulbs flat, oval, spikes of large lilac-rose flowers; spring.

M. Warscewiczii.—Bulbs flattish, erect spikes of reddish flowers, lip rosy-purple; spring.

Miltonioda.—Hybrids obtained by crossing Cochlioda and Miltonia.

Mormodes. — Remarkable for the curious structure of their flowers, which are produced on stout scapes from the base of the bulb.

M. luxatum. — Flowers yellowish-green, marked with brown; summer.

M. pardinum.—Flowers light-yellow, spotted with brownish-red; summer.

Odontioda.—A beautiful section of garden-raised hybrids between the genera Odontoglossum and Cochlioda. The majority include *C. Nœtzliana*, and yield many-flowered spikes of varying scarlet and reddish tints.

Odontocidium.—Garden-raised hybrids between Odontoglossum and Oncidium.

Odontoglossum.—The most popular section of cool house Orchids. Bulbs usually ovoid, leaves at base and apex, spike produced from base. Though natives of tropical countries, the plants are found at considerable altitudes, where the atmosphere is cool and moisture abundant.

O. Adrianæ.—Natural hybrid between crispum and Hunnewellianum; spring.

O. Andersonianum.—Natural hybrid between crispum and gloriosum; spring.

O. aspersum. — Natural hybrid between maculatum and Rossii; winter.

O. bictoniense.—Bulbs flattish, oval, flowers yellowish-green, blotched with brown; autumn.

O. Cervantesii.—Dwarf habit, flowers round, whitish, with concentric red bars; spring.

O. cirrhosum.—Segments of flowers tapering, white, spotted with purplish crimson; spring.

O. citrosmum.— Spike pendulous, flowers round, rose-white; spring.

O. Coradinei.—Natural hybrid between crispum and Lindleyanum; spring.

O. cordatum.—Flowers chestnut-brown, petals yellow; spring.

O. coronarium.—Bulbs large, at intervals on rhizome, flowers round, glossy, red-copper, lip yellow; spring.

O. crispum.—Arching spikes of white flowers, sometimes tinged with rose or blotched with purple; spring.

O. Edwardii. — Bulbs long, spike tall, flowers small, numerous, purplish-mauve; spring.

O. excellens.— Natural hybrid between Pescatorei and triumphans; spring.

O. gloriosum.—Flowers with narrow segments, yellow, brown-spotted; spring.

O. grande.—Flowers 5–7 ins. across, bright yellow, barred with chestnut-brown; autumn.

O. Hallii.—Flowers yellow, blotched with chocolate-red, lip broad, fringed; spring.

O. Harryanum.— Flowers large, sepals brown and yellow, petals whitish and mauve-purple, lip broad with prominent crest; spring.

O. hastilabium.— Spikes erect, 3–5 ft., flowers yellow, shaded with green, spotted with purplish-brown; summer.

O. Hunnewellianum.—Flowers small,

yellow, heavily spotted with dark brown; spring.

O. Insleayi.—Flowers large, yellow, barred with chestnut-red; late summer.

O. Kegeljani. — Flowers yellow, blotched with brown; spring.

O. Lindleyanum. — Flowers with narrow segments, yellow, with brown markings; spring.

O. luteopurpureum.—Flowers large, chestnut-brown, marked with yellow, lip brown; spring.

O. maculatum.—Sepals brown, petals yellow, lip yellowish-white; spring.

O. nævium. — Segments narrow, white, spotted with red-purple; summer.

O. nebulosum.—Flowers roundish, white, with red-brown spots; late spring.

O. odoratum.— Segments narrow, yellow, with brown-red blotches; winter.

O. Pescatorei. — Spikes branching, flowers white, lip with broad apex; spring.

O. pulchellum.— Erect spikes of small, pure white flowers; spring.

O. Rossii.—Dwarf, flowers white or rose, with dark brown spotting; winter.

O. Ruckerianum.—Natural hybrid between crispum and gloriosum; spring.

O. triumphans. — Flowers golden-yellow, blotched with brown; spring.

O. Uro-Skinneri.—Spike erect, sepals and petals greenish, marked with brown, lip large, rose; spring.

O. Wilckeanum.—Natural hybrid between crispum and luteopurpureum; spring.

Odontoglossum Hybrids. — A large number of attractive hybrids have been raised during recent years. The following are among the most useful:—

Ardentissimum (crispum × Pescatorei); *Dora* (Lambeauianum × Pescatorei); *eximium* (ardentissimum × crispum); *Fascinator* (Adrianæ × crispum); *illustrissimum* (ardentissimum × Lambeauianum); *Lambeauianum* (Rolfeæ × crispum); *MacNabianum* (Harryanum × Wilckeanum); *Ossulstonii* (crispo-Harryanum × Pescatorei); *percultum* (Rolfeæ × ardentissimum); *Queen Alexandra* (Harryanum × triumphans); *Rolfeæ* (Harryanum × Pescatorei); *Thompsonianum* (Edwardii × crispum); and *Vuylstekei* (harvengtense × Wilckeanum).

Odontonia.—Garden-raised hybrids between the genera Odontoglossum and Miltonia.

Oncidioda.—Garden-raised hybrids between the genera Oncidium and Cochlioda.

Oncidium.—A large and varied genus, distributed throughout South America and the West Indies.

O. ampliatum. — Bulbs broad, flowers 1½ ins. across, yellow; spring.

O. bicallosum. — Bulbless, leaves leathery, flowers yellow; winter.

O. Cavendishianum. — Bulbless, leaves leathery, flowers 1–2 ins. across, yellow, spotted with red; spring.

O. concolor. — Spikes drooping, canary-yellow; early summer.

O. crispum.—Flowers large, brownish, segments crisped; various.

O. curtum.—Spike 2–3 ft. high, branched, flowers brown and yellow; spring.

O. flexuosum.—Bulbs at intervals on ascending rhizome, large yellow lip; summer.

O. Forbesii.—Flowers large, segments broad, chestnut-brown, yellow markings; autumn.

O. incurvum.—Spikes 3–6 ft. long, flowers small, rose-pink, tipped with white; autumn.

O. Kramerianum.—Spike 2–3 ft., flowers large, lower sepals and lip yellow, marked with red-brown; various.

O. macranthum.—Spike several feet long, flowers large, sepals brownish, petals yellow, lip white and purple; early summer.

O. Marshallianum. — Lip large, spreading, bright yellow; early summer.

O. ornithorhynchum.—Spikes 1–2 ft., flowers small, rose-lilac; winter.

O. papilio.—Resembling *O. Kramerianum*, but upper part of scape is flattened; various.

O. tigrinum.—Spikes 2–4 ft., flowers large, lip spreading, yellow; late autumn.

O. varicosum. — Spikes 3–5 ft., branched, lip large, bright yellow; autumn.

Peristeria.—Characterised by stout bulbs, from the base of which the flower spikes are produced; broad, plicate leaves, and large fleshy flowers of globular shape. Natives of Central America.

P. elata.—Robust, bulbs 6 ins. high, erect spike 3–6 ft., flowers waxy-white.

Phalocalanthe. — Garden-raised hybrids between the genera Phaius and Calanthe.

Phaius.—Bulbs short, stout, on thick rhizomes. Leaves tall, plicate, spike erect, flowers large, lip spurred at its base.

P. bicolor.—Bulbs small, flowers reddish-brown, lip white and rose; summer.

P. Blumei.—Spike 3–4 ft. high, flowers buff-yellow, mottled with red, front of lip crimson; spring.

P. flavus.—Bulbs 3–5 ins. high, flowers ochre-yellow; summer.

P. Humblotii.—Spike 18–30 ins. high, flowers light rose-purple; spring.

P. maculatus.—Leaves spotted, flowers buff-yellow, lip reddish; spring.

P. tuberculosus.—Bulbs stem-like, flowers white, lip rose; winter.

P. Wallichii.—Spike 3–5 ft., flowers tawny-buff, shaded red, lip white with yellow base; late winter.

Phalænopsis.—Distinguished by absence of bulbs, the plants having large, broad, usually leathery leaves. Roots flat and clinging, often of considerable length. Distributed throughout the Eastern Tropics.

P. amabilis.—Leaves green, flowers 3–5 ins. across, segments broad, pure white; winter.

P. Aphrodite.—Somewhat similar to *P. amabilis*, but more compact, lip broader; winter.

P. esmeralda.—Erect spikes of amethyst-purple flowers about an inch across; late summer.

P. Lowii.—Dwarf, leaves green, flowers 1½–2 ins. across, white, lip purple; summer.

P. rosea.—Leaves green, flowers 1½ ins. across, white flushed with rose-purple.

P. Sanderiana.—Flowers large, rose-pink, lip white marked with rose-purple; late autumn.

P. Schilleriana.—Leaves marbled, green and grey, spike 2–4 ft., flowers light rose-purple, sepals speckled; spring.

P. Stuartiana.—Leaves mottled, flowers white, lightly spotted; winter.

P. violacea.—Leaves bright green, flowers 2–3 ins. across, white shaded with violet-purple; summer.

Platyclinis.—Bulbs small, bearing a single, stalked leaf, and producing from the apex a slender, many-flowered spike. Natives of the Philippines.

P. filiformis.—Bulbs 1 in. high, flower stalk very slender, canary-yellow; summer.

P. glumacea.—Bulbs 2 ins. high, flowers yellowish-white, scented; spring.

Pleione.—Distinguished from Cœlogyne by the bulbs being of annual duration only. Leaves deciduous, usually falling after the bulbs are matured.

P. humilis.—Flowers 2–3 ins. across, blush-white, lip purple spotted; winter.

P. lagenaria.—Flowers rose-lilac, lip white, marked with crimson; winter.

P. maculata.—Flowers white, lip marked with crimson; autumn.

P. præcox.—Flowers 3 ins. across, rose-purple; early winter.

Pleurothallis.—Epiphytal plants of tufted habit, or stems borne at intervals on a creeping rhizome. Flower spikes produced from base of leaf, in many instances for several successive years.

P. Grobyi.—Flowers small, yellow streaked with crimson; various. Height, 3–4 ins.

P. Rœzlii.—Spikes nodding, flowers blackish-purple; spring. Height, 12–15 ins.

Renanthera.—Allied to Vanda, clothed with distichous leaves, and bearing panicles of showy flowers on lateral peduncles.

R. coccinea.—Stem tall, flowers 3–4 ins. across, blood-red, lip small, yellow and red; various.

R. Imschootiana.—Dwarf, flowers many, bright vermilion; spring.

Restrepia.—Somewhat similar in habit to Pleurothallis. Flowers produced singly on slender peduncles. Upper sepals and petals thread-like, lower sepals much larger. Natives of cool districts in Colombia, etc.

R. antennifera.—Flowers yellowish, marked with red; summer. Height, 4–6 ins.

R. maculata.—Flowers yellowish, densely spotted with brown-purple; summer.

R. striata.—Flowers yellowish, lower sepals striped with maroon; summer.

Rhyncostylis.—A small genus closely allied to Saccolabium. Flowers in dense cylindrical racemes, produced from the axils of leaves; labellum a long, saccate, compressed spur.

R. cœlestis.—Leaves 4–6 ins. long, scape erect, flowers tipped with blue; summer.

R. retusa.—Leaves 8–12 ins. long, scape pendulous, 1–2 ft. long, flowers white, purple spotted; summer.

Saccolabium.—Stems furnished with leathery distichous leaves, from the axils of which the flowers are produced.

The basal portion of the lip developed into a saccate spur. Natives of India, Burma, etc.

S. bellinum.—Flowers yellow, marked with purple, lip spreading, fimbriated; spring. Height, 4–6 ins.

S. curvifolium.—Flowers cinnabar-red; summer. Height, 6–12 ins.

Sarcochilus.—A polymorphic genus, distributed from Burma to Australia and the Philippines. Flowers usually with a saccate lip, and often prettily coloured.

S. Fitzgeraldii.—Stems short, spike drooping, flowers 1 in. across, spotted with rose-purple; summer.

S. Hartmanni.—Stems short, leaves fleshy, flowers white, marked with red; spring.

Schomburgkia. — Robust plants, allied to LÆLIA, bulbs somewhat cylindrical, leaves leathery. Flowers produced at apex of long, arching spikes.

S. crispa.—Bulbs 4–8 ins. high, spike 2–4 ft., flowers crisped, brown and yellow, lip whitish; winter.

S. Lyonsii.—Bulbs 6–12 ins. high, spike 3–4 ft., flowers white, marked with purple; summer.

S. tibicinis.—Bulbs 9–18 ins. high, spike 3–5 ft., flowers reddish-brown; early summer.

S. undulata.—Bulbs 9–12 ins. high, spike 2–4 ft., flowers purplish-brown; spring.

Scuticaria.—Characterised by fleshy stems and long sub-terete leaves, which are pendent. Short scapes produced from side of stem.

S. Hadwenii.—Leaves 9–18 ins. long, flowers 3 ins. wide, yellowish-green, blotched with brown; summer.

S. Steelii.—Leaves 2–4 ft. long, flowers 3 ins. wide, light yellow, marked with reddish-brown; summer.

Selenipedium.—South American representatives of the genus Cypripedium. Leaves leathery, strap-shaped. Scape producing a succession of flowers, only one or two being open at the same period.

S. caudatum.—Flowers large, petals ribbon-like, often 30 ins. long; early summer.

S. longifolium.—Leaves 2 ft. long, dorsal sepal green, with rosy veins, petals twisted; various.

Sobralia. — Evergreen, terrestrial plants, chiefly of Central America. Stems reed-like, tall, furnished with sheathing leaves. Flowers large, produced from apex of stem.

S. macrantha.—Stems 4–8 ft. high, flowers crimson-purple, lip broad; summer.

S. rosea.—Stems 3–6 ft., flowers rosy-mauve, lip crimson-rose; summer.

S. Ruckeri.—Stems 4–6 ft. high, flowers rose-flushed, lip lilac-rose; summer.

S. Sanderiana.—Stems 4–8 ft., flowers rose-tinted, lip crimson-purple; summer.

S. xantholeuca.—Stems 3–8 ft., flowers creamy-yellow, lip darker; summer.

Sophrocattleya.—Garden-raised hybrids between the genera Sophronitis and Cattleya.

Sophrolælia.—Garden-raised hybrids between the genera Sophronitis and Lælia.

Sophrolæliocattleya. — Garden-raised hybrids between Sophronitis, Lælia, and Cattleya.

Sophronitis. — Epiphytal plants of dwarf habit, the small bulbs having a single, leathery leaf. Natives of Brazil.

S. grandiflora.—Flowers comparatively large, brilliant scarlet; winter.

S. violacea. — Rhizome creeping, flowers violet-magenta; winter.

Spathoglottis. — Terrestrial, distributed throughout the East, from Burma to China. Rhizomes creeping, with small, corm-like bulbs, and tall, plicate, grass-like foliage.

S. aurea.—Leaves 2–3 ft., flowers 3 ins. wide, yellow; autumn.

S. Fortunei.—Leaves 9–18 ins. high, flowers 1–1½ ins. wide, yellow; autumn.

S. plicata.—Leaves 2–3 ft. high, flowers 1–2 ins. wide, rose-purple; summer.

S. Vieillardii.—Leaves 2–3½ ft. high, flowers 2 ins. wide, rose-white; autumn.

Stanhopea. — Epiphytal plants, natives of Central and South America, and producing large, handsome flowers, the lip of which is of remarkable construction and wax-like substance. Bulbs usually ovoid, with a single, broad leaf; spikes pendulous.

S. eburnea.—Flowers fragrant, ivory-white; summer.

S. oculata.—Flowers large, yellowish, with red spots; summer.

S. tigrina.—Flowers large, yellow and blood-red; summer.

S. Wardii.—Flowers large, fragrant, golden-yellow, spotted with red-purple; summer.

Thunia.—A small genus of tropical plants, having leafy, tapering stems, which produce nodding racemes of flowers.

T. alba.—Stems 2–4 ft. high, flowers white, lip fringed ; summer.

T. Bensoniæ.—Stems 2 ft. high, flowers amethyst-purple ; summer.

T. Marshalliæ.—Stems 2–3 ft. high, flowers white ; summer.

Trichopilia.—Epiphytal plants distributed throughout Central America. Bulbs usually flattish, with a single, leathery leaf. Spikes of large flowers produced from base of bulb.

T. crispa.—Spikes two to three flowered, crimson, margin crisped ; early summer.

T. fragrans.—Spike erect, flowers greenish-white, lip spreading ; autumn.

T. laxa.—Flowers dull rose, lip whitish ; various.

T. suavis.—Flowers large, cream-white, rose spotted ; spring.

T. tortilis.—Flowers with narrow twisted segments, rose, lip blotched with red-brown ; various.

Vanda.—Handsome epiphytal plants distributed throughout the warmer countries of the East. Stems erect, clothed with distichous, evergreen leaves. Flowers produced on scapes from the axils of the leaves.

V. Amesiana.—Stems short, flowers fragrant, white, lip deep rose.

V. coerulea.—Stems 1–3 ft. high, flowers large, sky-blue, lip small ; autumn.

V. Hookeriana.—Stems 2–5 ft. high, leaves slender, cylindrical, flowers whitish, purple flushed ; autumn.

V. Kimballiana.—Leaves 6–9 ins. long, flowers white, purple flushed ; autumn. Height about 1 ft.,

V. lamellata.—Dwarf habit, leaves 12–15 ins. long, flowers yellow, blotched with brown ; winter.

V. Parishii.—Stems short, leaves 6–9 ins. long, flowers greenish-yellow, marked with brown, lip purple ; summer.

V. Sanderiana.—Flowers 5 ins. across, rose, marked with reddish spots and veins, lip small. Very handsome ; late summer.

V. suavis.—Leaves 12–18 ins. long, flowers white, purple spotted, lip rose-purple ; various. Height, 2–5 ft.

V. teres.—Stems and leaves terete, flowers rose-white to magenta-rose ; spring.

V. tricolor.—Leaves 12–18 ins. long, flowers yellowish-white, with reddish-brown marks ; various. Height, 2–5 ft.

Vanda Hybrids.—Two elegant hybrids artificially raised are *Marguerite Maron* (suavis × teres) and *Miss Joaquim* (Hookeriana × teres).

Vanilla.—Climbing or scandent plants, usually with fleshy leaves, and with large flowers. The elongated capsules yield the well-known flavouring material.

Vuylstekeara.—Garden-raised hybrids between the genera Cochlioda, Miltonia, and Odontoglossum.

Wilsonara.—Garden-raised hybrids between the genera Cochlioda, Odontoglossum, and Oncidium.

Zygocolax.—Garden-raised hybrids between Colax and Zygopetalum.

Zygonisia.—Garden-raised hybrids between Aganisia and Zygopetalum.

Zygopetalum.—A large, polymorphic genus, epiphytal, and distributed chiefly through Central America.

Z. crinitum.—Bulbs 2–3 ins. high, leaves 1–2 ft., flowers green and brown, lip white, with densely haired violet-blue veins ; winter.

Z. intermedium.—Somewhat similar to *Z. crinitum*, but lip slightly downy ; autumn.

Z. Mackayi.—Differs from *Z. intermedium* by its perfectly hairless lip ; autumn.

Z. maxillare.—Bulbs 2–3 ins., at intervals on creeping rhizome, lip violet-blue, with fleshy crest ; various.

Z. rostratum.—Bulbs 2–3 ins. high, at intervals on creeping rhizome, flowers greenish, lip white ; summer.

G. W.

ORCHIDS : Hardy.—See *HARDY ORCHIDS.*

ORCHIDS : Potting and Watering of. The cultivation of Orchids forms an important branch of the gardener's art, and next to the provision of the necessary houses, with suitable climatic conditions, comes the question of potting and watering of the plants. The latter includes the important process of damping down, by which the necessary amount of atmospheric moisture is provided, and this in turn depends largely upon the outside conditions and the amount of artificial heat that has to be given.

Potting.—Orchids fall naturally into two great classes, *terrestrial* and *epiphytic*, the cultivation of the former presenting no more difficulty than that of an ordinary stove or greenhouse plant. The roots of a plant serve the double purpose of obtaining a secure anchorage to the soil and of absorbing the food materials, by means of the absorbent root hairs. In terrestrial Orchids the roots are either of the usual fibrous nature or are thick and fleshy, with numerous root hairs, the latter class chiefly thriving where there is a large mixture of humus in the soil. Epiphytes are more or less adapted to an aerial mode of existence, and many of them grow naturally up in the trees, where the conditions are very different from those of the forest floor. This position is mainly determined by the necessity of obtaining an adequate amount of light, but it entails modifications of root structure which renders special cultural conditions necessary. Terrestrial Orchids are mainly natives of woodlands, of more or less shaded rocks, or of open prairies and marshes. There is a kind of intermediate class, sometimes called *pseudo-epiphytes*, the members of which grow chiefly among accumulations of humus in forks of the branches of the trees, and these, as regards their cultural requirements, are practically humus-loving terrestrials.

True epiphytes are mainly known by a modification of root structure, this taking the form of a white, papery covering to the thickened aerial roots, this covering—known technically as the *velamen*—being partly protective and partly absorbent of atmospheric moisture. Aerial roots generally attach themselves to the bark of the branches of the trees, and besides absorbing the necessary nutriment, also provide a secure anchorage for the plant. In culture they frequently attach themselves to the sides of the pots or baskets. An important cultural point is that when the roots are actively growing, a green point protrudes from the apex, which becomes what is termed "sealed over" when the plants are at rest. Epiphytic Orchids are generally grown in wood baskets or shallow pans—occasionally on branches of trees with a little fibre wired on—and suspended from the roof of the house at a suitable distance from the glass. The larger kinds should be grown in ordinary pots and stood on the stages.

The best time for potting is just when the young roots are beginning to push out as the plants resume their season's growth; they are then able to avail themselves of the new compost. The chief exception to this rule is where the plants flower just when the young growths and roots are appearing, in which case delay is permissible until the flowers are over, but extra care must be taken that the young roots are not broken during the process. There is no fixed time for potting, as different Orchids start into growth at quite different periods, and this is a great convenience where large numbers are grown.

Composts depend largely upon the class of Orchid being dealt with, and different growers often have their own special mixtures. For such widely grown Orchids as Masdevallias, Miltonias, Odontoglossums, and Oncidiums, however, a mixture of good peat, A1 fibre,[1] and sphagnum moss in equal parts is suitable. For the whole of the Cattleya group use clean A1 fibre with a liberal admixture of sphagnum moss. Peat or osmunda fibre may also be added, the chief thing being that the fibre is clean, porous, and consequently not too retentive of moisture. Angræcums, Phalænopsis, and Vandas succeed in a similar compost, with rather more sphagnum added. For Dendrobiums and similar plants use three parts of A1 or osmunda fibre with one part sphagnum. For such terrestrial Orchids as Calanthes, Lycastes, Phaius, Zygopetalums, and the green-leaved Cypripediums, a mixture of peat, A1 fibre, and loam fibre, with an admixture of sphagnum, some broken leaves, and a little sharp sand and finely broken crocks to keep it open, is suitable. The tessellated-leaved Cypripediums succeed best when the loam is left out. Most other Orchids can be referred to one or other of these classes.

Use clean, well-drained pots, with a little of the roughest of the compost over the drainage to keep it open. Any dead roots or old pieces of the rhizome should be cut away, after which insert the plant in position, and add the compost gradually, making it firm with a potting stick. Firm potting is important, and a stake should be added whenever necessary. Epiphytic Orchids should have the base of the plant about level with the rim of the pot, but terrestrial kinds should be put rather lower, so as to leave more room for watering. The compost should be only slightly moist when used, after which very slight watering is required until the new roots have taken hold of it.

---

[1] A1 fibre is not a proprietary article, as every Orchid grower will be aware.—EDITOR.

Watering.—This depends largely upon the season of the year, and whether the plant is in active growth or at rest. After potting, the roots generally take hold of the new compost quickly, and the plants then begin to grow strongly, when they will require an ample supply of water. Care should be taken not to give water until the compost has become moderately dry, as this helps to keep it from becoming sour; on the other hand, no plants must suffer from want of water at this stage. When water is required give a good soaking, and any surplus will drain away at once. As soon as growth is completed, the supply of water at the root should be gradually reduced until the plant is at rest, when only sufficient will be required to keep the compost just moist.

The requirements of different groups differ greatly, and no absolute rules can be given. In a general way it may be said that deciduous or semi-deciduous species, and those with very fleshy leaves, require moderate drying when at rest, while at the other extreme are species which are never quite at rest, and for these the compost should be kept just moist in the winter. Species having pseudo-bulbs can generally be kept drier when at rest than those without them. Perfect drainage and a well-aerated compost are essential in the case of all epiphytic Orchids, as this approximates to their condition in a state of nature. Stagnant water hastens the decay of the compost, and a sour compost in turn leads to the loss of roots and a consequent reduction in the food supply of the plant.

The question of atmospheric moisture is a very important one in Orchid culture, particularly in hot weather, and this is provided for by damping down the floors and stages of the house as necessary, and on hot afternoons by a light syringing of the pots and surface of the compost, care being taken not to lodge water in the young growths, which may result in their decay. On wet, sunless days less damping down is necessary, since the air is naturally moist; also the plants need much less when at rest, especially during the winter months. During the latter period the use of much fire heat to maintain the necessary temperatures results in a drying of the atmosphere, and this is corrected by an increase in the amount of damping down. Judgment is necessary, the time of year and the condition of the plants being taken into consideration, but experienced growers on entering the house can tell by the feeling of the atmosphere whether the conditions are right.

R. A. R.

ORCHIS.—For the best species see *Hardy Orchids*.

OREGON CRAB APPLE (*Pyrus rivularis*).—See *Trees*.

ORGANIC MANURES.—See *Manuring: Principles of*.

ORGANIC MATTER.—See *Chemistry for Gardeners* and *Manuring: Principles of*.

ORGANIC PRODUCTS.—See Nitrogenous Manures in *Manures*.

ORGANISATIONS.—See *Allotment Organisations*.

ORGYRIA.—See Vapourer Moth in *Insect Pests*.

ORIENTAL PLANE (*Platanus orientalis*).—See *Trees*.

ORIENTAL POPPIES (*Papaver orientale*).—See *Poppies: Perennial Border Species*.

ORIENTAL SPRUCE (*Picea orientalis*).—See *Trees*.

ORIGANUM (Marjoram, Nat. Ord. Labiatæ).—A few of the many species of this genus are worthy of including in the herbaceous border apart from such herbs as Sweet Marjoram (*O. Majorana*); Pot Marjoram (*O. Onites*); and Wild or Common Marjoram (*O. vulgare*). See article on *Potherbs*. One of these desirable species, *O. Dictamnus*, popularly known as Dittany of Crete, is an attractive pink, July blooming border plant about 12 ins. high. Another, *O. hybridum*, is useful in the rock garden, and bears its little pink flowers from June to August on plants 6–9 ins. high. A third, *O. pulchrum*, is also pink, and similar to *O. hybridum*, but it may attain a height of 12 ins. All thrive under the treatment usually given to rock plants and the dwarfer perennials if grown in light soil, and may be propagated by cuttings, division of the roots, and seeds, at the usual times in the spring and summer.

ORLAYA.—Now included in the genus *DAUCUS*.

ORMENSIS.—Now included in the genus *ANTHEMIS*.

ORNAMENTAL GOURDS.

Apart from the edible gourds and pumpkins (see notes on *PUMPKINS AND GOURDS*) there are a large number of kinds which are exceedingly curious and ornamental. The majority are easily grown, and if given the ordinary treatment for vegetable marrows will succeed admirably. The best way, however, is to treat them as half-hardy annuals, sowing early in heat, and either potting on or pricking off as soon as large enough to handle, subsequently planting them out when all danger of frost is past, so that they can ramble over arbours, trellis work, rockeries, or rooteries. Beauty spots can easily be made if these are planted in ugly corners, and heaps of rotting vegetable refuse might easily be beautified by planting these on them.

The best ornamental sorts are: BISHOP'S MITRE GOURD, BOTTLE GOURD, HEDGEHOG GOURD, HERCULES' CLUB, LOOFAH, MAMMOTH GOURD, NAPLES GOURD, NUTMEG GOURD, OHIO SQUASH, OSTRICH EGG, POWDER FLASK, RED TURK'S CAP, SCARLET GOURD, SNAKE CUCUMBER, SQUIRTING CUCUMBER, SYPHON GOURD, TEASEL GOURD, WARTED GOURD, WAX GOURD, WHITE TURK'S CAP, and YELLOW HUNDREDWEIGHT. Seeds of these can be obtained from all first-class seedsmen.

ORNAMENTAL GRASSES.

Considering their undoubted value, and the ease with which they may be grown, it is strange that ornamental grasses are not more frequently seen in gardens. They are admittedly decorative in flower borders, and everyone who has had the care of cut flowers for vase decoration will know how easy it is to get a pretty effect if only a few light sprays of grasses are available, and yet it is just these latter that are generally lacking. It surely must be that they are overlooked at sowing time. In the green state, grasses are a very agreeable change from the usual Gypsophila in the making up of bouquets, and they are available for a longer period, while for adding grace to winter posies of "Everlasting" flowers and highly-coloured berries, they are, of course, indispensable. For this latter purpose the grasses should be cut as soon as the flower heads are fully expanded, tied in small bunches, and hung upside down to dry in an airy position.

The greater number of the best sorts are hardy annuals, and thrive with the minimum of care which is generally allotted to annual flowers, but whether it is grasses or flowers a good return is always got by sowing thinly and allowing ample space for development. It will be found necessary, in most cases, to pull the seed-heads into small pieces for convenience of sowing. All the varieties may be grown in vacant spaces in the flower border, but they are well worth a small plot reserved exclusively for them. The perennial sorts may be sown any time from March till June, and being much slower in growth, they require more care than the annuals. It is well to sow them thinly on a well-prepared seed-bed, transplanting as soon as large enough, and putting into flowering positions in the autumn. All grow freely in ordinary garden soil.

Some of the dwarf-growing sorts, such as *Lamarkia aurea* and HARE'S-

TAIL GRASS (*Lagurus ovatus*), make a very neat and effective edging for summer beds, while the perennial FEATHER GRASS (*Stipa pennata*), with its long drooping plumes, is available where a permanent bordering is desired.

Some Good Varieties.—The following notes include only the most desirable sorts of easy cultivation. All are annuals unless otherwise stated :—

Agrostis nebulosa (CLOUD GRASS).—Very light and graceful, the fully developed panicles resembling a mist-like veil. One of the most useful for small vases. It grows about 18 ins. high.

Agrostis laxiflora is somewhat similar to the preceding, but has longer branches to the seed-head.

Agrostis pulchella is a miniature form, growing 4–6 ins. high, but has the same elegant inflorescence. It is well adapted for edgings and for pots in the cold greenhouse.

Avena sterilis (ANIMATED or WILD OATS). — This is a strong-growing grass about 2 ft. high, with large drooping spikelets. There are pale-seeded and dark-seeded forms, and the latter are generally considered the more decorative.

Briza gracilis (LITTLE QUAKING GRASS).—This is a miniature form of the native Quaking Grass of our upland pastures. It is an exceedingly pretty little species, with pale green nodding spikelets on hair-like branches. Height, 9 ins.

Briza maxima is the GIANT QUAKING GRASS or PEARL GRASS, and well worth growing for its bold effect and large seed-heads. Height, 18 ins.

Bromus brizaeformis.—An elegant biennial grass, similar in habit to *Briza maxima*, but the spikelets are longer and narrower. Very decorative in the mixed border. Height, 1½–2 ft.

Coix Lachryma-Jobi (JOB'S TEARS). — A half-hardy species, which requires to be sown in February or March and planted out. In warm districts the seeds may be sown in April or May. The plant attains a height of 2 ft., and is unique in appearance on account of its peculiar large, greyish, round seeds, which hang in clusters from their sheaths, and from which the popular name is derived.

Eragrostis elegans (LOVE GRASS).—A large, spreading, loose-headed grass, particularly valuable for bouquets and large vases. Height, 2 ft.

Gynerium argenteum (PAMPAS GRASS).—One of the noblest and best known of all ornamental grasses. Its huge plumes are particularly striking in the autumn months. The plant is perennial, withstands the severest winters, and its long, handsome, curving foliage is attractive at all seasons of the year. There are some varieties with pinkish and creamy plumes, and a batch of seedlings will generally give such variations. Height, 5–8 ft.

Hordeum maritimum (SQUIRREL-TAIL GRASS).—One of the best types of the Barley Grasses. It has very long, hairy, gracefully curved spikes, and grows about 2 ft. high. For winter use this grass should be gathered just after the spike has emerged from the sheath, as the seed-heads are liable to break in sections if allowed to become too ripe.

Lagurus ovatus (HARE'S-TAIL GRASS).—A very handsome grass with large, oval, downy heads, which suggest its common name. It is found wild in some parts of the country, and grows about a foot high. This is one of the favourite varieties, and some fine specimens may be obtained if sown during the autumn in a sheltered position, and planted out in the spring.

Lamarkia aurea has no recognised common name, but it is a well-known and pretty dwarf species, quite worthy of a place in all collections of Ornamental Grasses. Height, 6 ins.

Pennisetum longistylum (PLUME GRASS). — A downy-headed grass somewhat resembling the Hare's-tail, but the heads are much longer, sometimes growing to a length of 6 ins. This elegant species is not so hardy as some others, and will well repay sowing in slight heat and planting out. It grows about half a yard in height.

Stipa pennata (FEATHER GRASS). —A most desirable perennial, with long, slender, drooping plumes which reach nearly to the ground; extremely ornamental. Height, 18 ins.

Zea Mays variegata (VARIEGATED MAIZE).—This also belongs to the natural order of grasses, but will be found dealt with elsewhere.

S. & S.

ORNAMENTAL VEGETABLES.

In these brief notes will be enumerated a few species and varieties of vegetables noted for their decorative value in addition to their culinary worth. Such are given as a guide for those who, for any reason, wish to grow, or perforce must grow, vegetables near the house, and would like to know of those possessing some claim to ornamental or distinctive leafage.

First of all we must mention that greatly prized, early, succulent vegetable, *Asparagus*. For five or six months of the year its feathery sprays wave to and fro in the breeze, first green, then yellow, with its seeds of scarlet berries. Its presence in markets among cut flowers is well known. Then the *Globe Artichoke* is a handsome plant with greyish-toned, divided foliage, and, like Asparagus, can be planted to remain a number of years, if the position chosen be warm and sheltered. Its edible portion of scaly-globe heads is both interesting and attractive.

Beetroot is, perhaps, the best known of ornamental vegetables, and, in addition to usage in beds and borders, can be interplaced singly or grouped among other subjects. Preference should be given to the black-leaved variety as being the most striking. The finely cut fern-resembling tops of *Carrots*, we may mention, might more often be used in floral work, thus placing this root high among those of ornate importance. Beds of Carrots retain a neat appearance throughout the season. Well-grown *Endive* is also most pleasing, the curly-leaved sorts particularly evoking admiration.

Extremely picturesque are the *Kales* (Borecole or May Greens) with their curly and incised leaves. All Kales are more or less attractive, but for being the most distinct we may vote the Russian variety to first place; its leaves in a rather remarkable degree resemble deer's antlers. *Kohl Rabi* must claim a place on account of its most peculiar, albeit neat, growth. In addition to the usual central leaves, others spring out singly at different parts of the Turnip-like root, for which vegetable it makes a good substitute. We may mention that the purple variety is the more attractive. An old favourite comes next, namely, *Lettuce*. The cabbage type is the best for the purpose now in view. Nicely rounded heads of these are prim and pleasant to look upon, but special praise must be accorded the brown-tinged *Continuity*, which is very distinct, also to the beautiful Endive-leaved and Fringe-leaved varieties. *Maize* (Indian Sugar Corn or Sweet Corn) is another attractive and ornamental crop, with its upright and stately foliage, the cobs of corn having a frizzy tassel on each top. Long famed in Canada, it is getting more recognised, and rightly so, in English gardens.

Parsley is, perhaps, more strictly a herb, but because of its abundant and wide usage we class it here among ornamental vegetables. Large breadths of its rich green always look inviting, but it is as an edging plant it excels. For elegance of form choose the Crested and Fern-leaved sorts. [Many of the *Pot-herbs* and *Medicinal Herbs* are distinctly ornamental, and the reader should refer to the two articles on these.—Editor.]

The last three to be here dealt with are *Scarlet Runners, Tomatoes,* and *Vegetable Marrows.* Each requires some support to show its best in floral effect and utility. The bright scarlet blossoms of the Runners, and later the hanging clusters of Beans, are familiar sights clambering up poles and fences. Then we have the extensively grown Tomato. The blossoms, true, are rather insignificant, but the bunches of fruit even in the green state are, at least, an agreeable sight. But what shall we say of the scarlet clusters hanging on plant after plant? It is no exaggeration to call them beautiful.

Lastly, we may mention the humble Vegetable Marrow, which indeed makes a gratifying picture if trained up rough trellis-work, or allowed to ramble its own way over banks or mounds of turf and rubbish. It will cover many an unsightly spot with its verdant foliage lit up by its dazzling golden-yellow flowers, with here and there a huge dark green fruit. One cannot help wondering why this crop is not more grown by the gardener who wishes to combine utility with beauty.—C. T.

ORNAMENTAL WALLS.—These are referred to in the editorial note in *Garden Walls.*

ORNITHOGALUM.—See *Star of Bethlehem.*

ORNITHOPUS (Bird's-foot. Nat. Ord. Leguminosæ).—This is a genus of weedy, hardy annuals of no garden value. *O. perpusillus* is the Common Bird's-foot, and *O. sativus* is the weed known as Serradella. They bear yellow flowers from June to July, and average 6 ins. in height.

OROBUS.—Now included in the genus *Lathyrus.*

ORPINE (*Sedum Telephium*).—See *Sedum.*

ORRIS ROOT.—See *Medicinal Herbs.*

ORTHOPHOSPHATES.—See Calcium Orthophosphates in *Lime Compounds.*

ORTHOPHOSPHORIC ACID.—See Phosphoric Acid in *Acids: Their Uses in Horticulture.*

OSIER (*Salix viminalis*).—See *Trees.*

OSMANTHUS.—For the best species see *Climbing and Trailing Plants.*

OSMOSIS.—See *Plant Physiology.*

OSMUNDA.—For the best species and varieties see *Ferns and Fern Gardening.*

OSO BERRY (*Nuttalia cerasiformis*). See *Shrubs.*

OSTEOMELES.—For the best species see *Shrubs.*

OSTRICH EGG.—A name applied to a decorative gourd. See *Ornamental Gourds.*

OSTRICH FERN (*Onoclea germanica*). See *Ferns and Fern Gardening.*

OSTROWSKIA (Nat. Ord. Campanulaceæ).—One species of this genus, *O. magnifica,* is a magnificent, hardy, herbaceous perennial, but a rather shy bloomer except in warm districts. It dislikes a dry and ultra-sunny spot, but otherwise is easy to grow, and may be propagated without any difficulty by root division in March. It bears pale blue flowers from June to July, and grows 3–5 ft. in height.

OSTRYA.—For the best species see *TREES.*

OSWEGO TEA (*Monarda didyma*).—See *MONARDA.*

OTHOCALLIS.—Now included in the genus *SCILLA.*

OTIORHYNCHUS.—See OTIORHYNCHUS WEEVILS and RASPBERRY WEEVIL in *INSECT PESTS.*

OTIORHYNCHUS WEEVILS. — See *INSECT PESTS.*

OUTDOOR CHRYSANTHEMUMS.—See *CHRYSANTHEMUMS : CULTIVATION OF.*

OUTDOOR CUCUMBERS. — See *CUCUMBERS : OUTDOOR.*

OUTDOOR TULIP CULTURE.—See *TULIPS.*

OVAL-LEAVED PRIVET (*Ligustrum ovalifolium*).—See *SHRUBS.*

OVARY.—See under LIFE HISTORY OF FLOWERING PLANTS in *PLANT PHYSIOLOGY.*

OVERCUP OAK (*Quercus lyrata*). — See *TREES.*

OX-EYE DAISY (*Chrysanthemum Leucanthemum* and *C. maximum*).—See *CHRYSANTHEMUM : PERENNIAL BORDER SPECIES.*

OXALIC ACID.—See *PLANT PHYSIOLOGY.*

OXALIS (WOOD SORREL. Nat. Ord. Geraniaceæ). — This is a very large genus of hardy annuals, hardy herbaceous, or hardy perennials, doubtfully hardy or distinctly half-hardy bulbs, greenhouse herbaceous perennials and bulbs, half-hardy or stove evergreens, and hardy or half-hardy rock plants. It is impossible to describe species under each of these sections, but the most important are mentioned below.

Annual Species.—These require none but the usual treatment bestowed on hardy annuals, and are of very easy culture. The best species is :—

Oxalis corniculata.—This bears yellow flowers from August onwards, and averages 3 ins. high. Its variety *atropurpurea* has dark purple leaves, and *rubra* has darker leaves still.

Bulbous Species.—Most of these are not very hardy, and are most successful if given pot culture. They are not specially beautiful, though useful in the spring and autumn for greenhouse decoration. For outdoor culture a warm site and a light soil is required, and propagation by bulbils is the best way of increasing one's stock. Of the large number of species we recommend the following :—

Oxalis Bowiei.—Syn. *O. purpurata*, which see.

O. cernua (BERMUDA BUTTERCUP or BUTTERCUP OXALIS).—This bears umbels of bright yellow flowers in April, and grows 1 ft. high.

O. hirta (Syn. *O. rubella*).—This and its varieties bear lilac to crimson flowers in October, and grow 3–9 ins. high.

O. purpurata (Syn. *O. Bowiei*).—This, known by some as the CAPE SHAMROCK, bears bright rose flowers from August to September, and averages 6 ins. in height.

O. rubella.—Syn. *O. hirta*, which see.

O. tetraphylla.—This bears lilac flowers, sometimes inclining to rose, from June to July, and averages 6–9 ins. high.

O. versicolor.—This bears white flowers, which are red outside, in March and April on plants about 3 ins. high.—J. J. & E. T. E.

Greenhouse Species. — All the bulbous species just named are suitable for pot culture in the greenhouse, but should be kept dry in the winter. The following herbaceous kinds are also suitable for greenhouse culture, and should be kept moderately dry from November to March. These are best propagated by seeds and root divisions in the usual way, and grown in a mixture of good loam, peat, and sand. Temperature required for all grown in greenhouse culture, 40–45° F.

Oxalis floribunda.—Rosy-red, pure red, pure white, blush and lilac varieties of this blooming in March are grown at Kew. Height, 6 ins.

O. rosea.—Rose. Flowers in March. Height, 6 ins.

O. tuberosa.—Pink. Flowers in November. Height, 5 ins.

Perennial Border Species.—Only one is at all suitable, and this spreads rather rapidly. It requires none but the usual treatment given to hardy perennials, thrives in common garden soil, and is propagated by seed and division in the usual way.

Oxalis Acetosella (Common Wood Sorrel or Wood Sorrel).—This bears white flowers from May onwards, and grows 3 ins. high.

Rock Garden Species.—These are easily grown plants, generally with a tuberous or fleshy rootstock. They will thrive well in warm districts, and are best propagated by division of the roots in the autumn or spring. The three best are :—

Oxalis adenophylla. — This has greyish leaves in tufts from a tuberous rootstock. Flowers pink, with dark eye. Site, half-shade. Soil deep, gritty loam. Flowering Period, May to July. Height, 4 ins.

O. enneaphylla (Nine-leaved Wood Sorrel).—This has greyish leaves in tufts from fleshy rootstocks. Flowers usually white, though a rosy form is in cultivation. Site, half-shade. Soil deep, gritty loam. Flowering Period, May to July. Height, 4 ins.

O. lobata.—This has green foliage in tufts from tuberous roots. Flowers yellow. Site, half-shade. Soil gritty loam. Flowering Period, October. Height, 3 ins.

[An edible species, *O. Deppei*, is grown and used as a vegetable on the Continent, but is relatively unimportant here, and so its culture need not be described.—Editor.]

OXYCOCCUS.—For the best species see *Shrubs.*

OXYGEN.—A few notes on this element are given in our article on *Chemistry for Gardeners.*

OXYRIA.—See *Mountain Sorrel.*

OXYTENANTHERA.—See *Bamboos.*

OXYTROPIS (Nat. Ord. Leguminosæ).—This is a genus of comparatively little known but attractive, hardy, herbaceous perennials for rockwork, for edgings to borders, and for other similar purposes. They thrive with remarkable freedom in some rock borders where plenty of stone is used. For ordinary culture, a dry, sunny site and light soil are required. Propagation may be best effected by seeds or cuttings. The best time to plant is early in March. Of the numerous species that have been described most are purple. *O. montana* is yellowish-purple, *O. ochroleuca* is cream, *O. splendens* is rosy-red, and *O. uralensis* (Syn. *O. Halleri*) is purple. They bloom from April to July, and average 3–6 ins. high. For fuller descriptions larger works must be consulted.

New Variety.

Oxytropis hybrida grandiflora alba.—This has white flowers, with a dark spot on the keel.

OYSTER PLANT (*Mertensia maritima*). See *Mertensia.* The name is also applied to *Salsafy.*

OYSTER SHELL BARK SCALE.—See *Insect Pests.*

OYSTER SHELLS.—See *Fish as Manure.*

OZOTHAMNUS.—For the best species see *Climbing and Trailing Plants.*

PACKING FLOWERS AND PLANTS.—It is often necessary to send flowers or plants by post, and the majority of gardeners are at a loss to know how to do this so that the subjects may arrive at their destination as fresh as possible. The following few hints will no doubt be useful in this direction.

Flowers.—In packing these, use a strong, covered-in wicker basket where possible, or a flat, wooden box. Cardboard boxes, even if very strong, are quite unsuitable, as they inevitably get badly damaged in going by rail or through the post. Spread a layer of strong but soft paper in the bottom and round the sides. Damp this thoroughly, and lay the flowers as flat as possible in layers, with the stems and heads alternately at each end of the box. Fill as full as possible, making up the centre part with soft paper to prevent the flowers shaking about; damp thoroughly once more, cover the whole with more of the paper, and fix the lid on firmly.

Another way is to pack the flowers in thin layers between damp moss. The box should be lined and the top covered with similar material. This is not very suitable for flowers it is desired to keep spotlessly white.

Where the flowers have to go a very long journey, it is well to pack them so that their stems all go to the centre of the box. A small wooden archway is then put over the stalks at each side, and the central part filled with wet sand. The rest of the box is packed tightly with soft, crumpled paper, to prevent shaking, and a very close-fitting lid is required to prevent the sand from getting out of its compartment into the rest of the box.

Cotton-wool and sawdust should never be used for packing flowers. as they absorb too much of their moisture.

Plants.—The packing of small plants and seedlings is a comparatively easy and simple process. Seedlings should be made up into a nice bunch, the roots being tied round with well-damped moss, and the entire bunch wrapped in newspaper. Then thick, corrugated cardboard should be wound round them, with circular bits cut to fit the ends, and then the package should be wrapped in strong brown paper, tied with strong string, and a tie-on label fixed upon it. Small clumps of hardy herbaceous plants may be wrapped individually in damped newspaper and tied up with bast. They can then be packed tightly together in a shallow wooden box or strong basket as for flowers. Large clumps are more awkward. A deep hamper or small packing-case is the best thing in which to send them. Where the roots are at all easily damaged, a liberal amount of damp moss should be packed round them. Between each layer of clumps, moist, fresh-cut grass may be used, but not hay, straw, or cotton-waste. If such is not available, then damp crumpled newspaper should be used. The hamper or packing-case should be filled as full as possible, and packed very tightly as, if the contents shake about, they may be considerably damaged. The lid of the hamper should be strengthened with strips of wood in case the railway company see fit to turn it upside down. The lid of the packing-case should be nailed down very securely.

Care should be taken in carriage

by rail to see that the package is correctly labelled with postal and rail address. In the case of parcel post the packages have to conform to the sizes and weights given in the Post Office Guide. Observance of such points as careful packing will avoid many unnecessary delays and disappointments.—E.

PACKING FRUIT.—See *FRUIT GRADING AND PACKING.*

PACKING PLANTS.—See *PACKING FLOWERS AND PLANTS.*

PADUA RUE (*Ruta patavina*).—See *RUTA.*

PAEONIA.—See *PAEONY* and *SHRUBS.*

PAEONY (Nat. Ord. Ranunculaceæ). Florists' section, hardy shrubs, 2–3 ft. high. They succeed in deeply worked, rich loam, well manured, preference being given to cow manure if procurable, and are propagated by seed and division of the roots. The former method, being slow, is hardly suitable for the amateur. Division is best done in summer after the flowering season. The *Tree Paeonies* are usually increased by grafting, the stock employed being *P. officinalis.*

Culture.—The European Paeonies bloom in May, and the Chinese varieties in June and July. Few flowers make such a prodigal display of colour, and at the same time give such little trouble. Given a good, rich soil, an annual mulch of manure in March, and protection from morning sun after frost, the plants will look after themselves, gaining in beauty each year till the soil shows signs of exhaustion. Then they should be taken up and given a change of quarters, or a thorough renovation of the old sites made before being replanted.

Varieties.—The named varieties are so numerous that it would be impossible to give a representative selection, each specialist having his own list and his own names. The *Tree Paeonies* are not quite so hardy as the herbaceous section. A sheltered border facing south-west is suitable, or they may be grown in pots for cool house decoration in spring.—J. L. G.

UP-TO-DATE SELECTIONS.

Paeony Globe of Light.—Rose-pink and yellow.

P. Hiatt C. Baker.—Orange-green.

P. L'Esperance. — Yellow and pink.

P. Mlokosewitschii.—Yellow.

P. Moutan Hana Kurabe.—Rose-pink. Scented.

PAEONY-FLOWERED DAHLIAS.—See *DAHLIA : CULTURE OF.*

PÆSIA.—Now included in the genus PTERIS, for which see *FERNS AND FERN GARDENING.*

PAGODA TREE (*Sophora japonica*).—See *TREES.*

PAINT AND THE GARDEN.

There are two colours (if white can be called a colour) which are pre-eminently suitable for the garden—white and green—to these may be added chocolate, under certain conditions.

In painting new work, the wood should be first well primed with red and white lead priming, and afterwards painted three coats of white paint made from the best white lead, if white is required. A coat of lead colour should be given under green which has little body in it.

The stumps of fences should be tarred or creosoted, and the paint applied low down, an extra coat being given to all parts where much exposed to damp. When repainting old woodwork, any soil should be scraped away and the paint well washed. Greenhouses and painted woodwork under similar conditions should be well brushed, and if there are any traces of insect pests, disinfected before painting. The work should be sandpapered, and any blisters removed if necessary with the blow-lamp. Holes and crevices must be filled with putty and rubbed smooth. Nothing but the best white lead and other pigments with pure linseed oil and turpentine should be used. Boiled oil is apt to blister in the sun, and should be used sparingly, although a little in green and chocolate paint is beneficial. A word about brushes may be added, namely, get the best brushes you can, and pay a good price for them, if you want to do the work well.—F. W. B.

PAINTED WOOD-LILY (*Trillium erythrocarpum*).—See *TRILLIUM.*

PAK-CHOI.—A synonymous name for *CHINESE CABBAGE,* which see.

PALIURUS.—For the best species see *SHRUBS.*

PALLADIA.—Now included in the genus *LYSIMACHIA.*

PALMS.

Under the popular name of Palms there are included many genera and considerably over a thousand species. They form a very important group of plants, both on account of their noble and ornamental appearance, and of their great importance from an economic point of view. The majority are natives of tropical countries, where many of them form large trees, as in the case of the ROYAL PALM (*Oreodoxa regia*), which has a straight, almost cylindrical trunk towering upwards until it reaches 150 ft. or more. Others again have slender stems only a few feet in height, an example being the elegant *Cocos Weddelliana.* Their economic properties are many; sago, sugar, wax, and oil are all obtained from them, and thus these plants play a large part in supplying our daily wants. The AFRICAN OIL PALM (*Elaeis guineensis*) may be cited as an instance. The oil extracted from the kernels is annually imported into this country to the value of several million pounds. It is used extensively in the manufacture of candles, margarine, and soap. In the various countries to which Palms belong, they supply the natives with practically all the necessaries of life, including food, which is obtained from the fruit, stems, and young leaves. Wine or "toddy" is also obtained in large quantities from the stems and inflorescences, the former are also employed in the building of houses, while the leaves are used as a thatch, and in the manufacture of baskets, brushes, hats, household utensils and ropes.

Palms are grown in this country solely for their valuable decorative qualifications, and in the adornment of rooms, corridors, and entrance halls there is no other class of plants to surpass them.

Although many of the species attain such large dimensions in their native habitats, quite a number possess a sufficiently dwarf habit to admit of their being grown for a number of years in comparatively small pots.

Palms may be divided into two groups: those possessing fan-shaped leaves, such as Chamaerops and Livistona, and those known as feather-leaved Palms, of which Kentia and Phœnix are good examples.

Culture. — The cultivation of Palms is by no means difficult, their chief requirements being good drainage and an abundant supply of water in summer, less, of course, being needed in winter, although their roots must never approach dryness.

The general method of raising Palms is from seeds, which are imported in large quantities from their native countries. The seeds should be sown thickly in pans or boxes filled with a mixture of loam, leaf-soil, and sufficient sand to make it porous, covering them with about their own depth of soil. The pans should then be placed in a brisk temperature of 65–70° F., and kept moist. Germination will be hastened if the pans are plunged in a bed with bottom heat.

When two leaves have formed, the young plants should be placed singly into small pots, maintaining a high temperature and moist atmosphere. They require a fair amount of light to prevent them from becoming drawn, but should be shaded from bright sunshine. Liberal waterings both at the root and overhead will be required from now onwards, and as the pots become filled with roots the plants should be moved into a larger size, using a compost consisting of two parts fibrous loam to one of leaf-soil, with sufficient sand added to keep it open.

Palms succeed better when potted firmly and kept in small pots. Unless the roots are lifting the soil above the rim of the pot, it is better to apply a top-dressing in which a small proportion of some reliable concentrated manure, such as guano, is added, or water them with manure water made from cow manure and soot. By such treatment they can be kept in a healthy state for a considerable time.

Although tropical Palms delight in a warm, moist atmosphere, many of them will endure the cooler and somewhat dry conditions of a greenhouse, providing the temperature does not fall below 45° F. in winter. As, however, these last are rather troublesome to grow, they cannot be generally recommended.

Palms are liable to attacks of insect pests, such as mealy bug, red spider, scale, and thrips. When badly infested the leaves soon become disfigured, and the plants completely lose their value for decoration. The most effectual mode of destroying these pests is by carefully washing the leaves with a sponge and soapy water or some reliable insecticide.

SELECTION OF PALMS.

The following list contains those Palms which are most suitable for the decoration of the conservatory and the dwelling-house.

Archontophœnix Cunninghamiana.—This favourite ornamental Palm is frequently met with under the name of *Seaforthia elegans.* It is a native of Queensland, where it grows to a height of 60 ft. In a young state it is a most useful Palm for the conservatory.

Chamaedorea. — This comprises about sixty species, all natives of tropical America. *C. corallina* and *C. glaucifolia* are both elegant, slender-growing species with pinnate leaves.

Chamaerops humilis.—This is a low-growing Palm with fan-shaped leaves. It thrives in the open air in summer, and is frequently used in sub-tropical bedding. Propagation may be effected by means of suckers which are freely produced at the base. It is of interest as being the only Palm indigenous to Southern Europe. It grows about 10 ft. high.

Chrysalidocarpus lutescens (Syn. *Areca lutescens*). — This is one of the most popular and ornamental of Palms. It produces numerous stems, and the long, plume-like leaves are bright green, with yellow petioles. It is a native of Madagascar, growing about 20 ft. high.

Cocos.—This is a very beautiful genus of stove Palms. The most popular for decorative purposes are *C. plumosa* and *C. Weddelliana.* The latter is a dwarf Palm from Brazil; it seldom exceeds 4 ft. in height. The graceful, pinnate leaves are rich green above and glaucous beneath. It is a Palm which delights in heat and moisture.

The former, also a native of Brazil, is a robust species with dark green, plume-like leaves. It is a useful Palm in the decoration of large halls.

Geonoma gracilis.—This is a very elegant plant, with dark green, arching leaves, closely resembling those of *Cocos Weddelliana.* It is a native of Brazil.

Howea Belmoreana and *H. Forsteriana* are undoubtedly the most popular of all Palms, and for elegance, combined with the rough treatment they will endure, there is no other Palm to surpass them for beautifying rooms and corridors. They are generally known under the name of *Kentia. H. Belmoreana* differs from *H. Forsteriana* in having the pinnate leaves beautifully arched, whereas in *H. Forsteriana* the leaves spread horizontally. They are both natives of Lord Howe's Island, and grow 10–30 ft. in height.

Livistona australis.—This is an ornamental, fan-leaved Palm, perhaps better known as *Corypha australis.* It forms a splendid specimen for the conservatory, and is also useful in the sub-tropical garden during summer. A native of Eastern Australia, it will grow up to 80 ft. high.

L. chinensis (Syn. *Latania borbonica*) is one of the commonest of Palms, bearing large, fan-shaped leaves. The hardy constitution of this plant renders it most useful for general decorative purposes. A native of China and Japan, it will grow 20–40 ft. in height.

Phœnix.—This is a very handsome genus of feather-leaved Palms. In a young state they are among the most useful for the decoration of rooms, while larger plants may be employed with advantage in the sub-tropical garden. A greenhouse temperature will suit them in winter. A few of the best are: *P. canariensis*, which produces a large and graceful head of leaves; *P. dactylifera*, the DATE PALM,[1] which much resembles the former, though the leaves grow erect; and *P. humilis Roebelini*,[2] which is undoubtedly the gem of the genus, and of late years it has become a favourite pot plant. This last is a dwarf Palm, having the leaves arranged in a very symmetrical manner. It is a native of Siam. The height of these PHŒNIX PALMS, as they are sometimes called, varies greatly; the dwarf form grows 2–10 ft., while others will be up to 50 ft. high.

Rhapis flabelliformis and *R. humilis* are two slender-growing Palms with fan-shaped leaves. In appearance they are much alike, but the leaves in *R. humilis* are larger. They are both ornamental plants, and will stand a considerable amount of rough treatment. They are natives of China and Japan, growing about 6 ft. high.

Rhopalostyle (Syn. *Areca*).—This is a genus of two species of greenhouse Palms, especially useful in a small state. *R. Baueri* comes from Norfolk Island, whilst *R. sapida* is the NICKAU PALM of New Zealand.

Trachycarpus excelsus is perhaps better known under the name of *Chamaerops Fortunei.* It is one of the commonest and most useful of Palms. In many parts of Great Britain it is quite hardy, and specimens planted on lawns are frequently met with. It is also one of the best greenhouse Palms, and being a slow grower, it is many years before the plant becomes too large for a small house. A native of China and Japan, it grows 20–30 ft. high.—T. W. T.

---

[1] It does not fruit in this country.

[2] This variety will probably be recognised as a species in the near future.—EDITOR.

PAMPAS GRASS.—See *CORTADERIA*, *GYNERIUM*, and *ORNAMENTAL GRASSES*.

PAMPHILUS.—See SOCIAL PEAR SAWFLY IN *INSECT PESTS*.

PANCRATIUM (Nat. Ord. Amaryllidaceæ).—This is a genus of attractive bulbs, of which there are very many stove species. The hardy one which concerns us, *P. illyricum* (Syn. *P. stellare*), and its half-hardy brother, *P. maritimum*, both bear white flowers in May or June, and grow 1½–2 ft. in height. They are of easy culture, thriving in ordinary light, rich, loamy soil, to which some peat has been added, and can be planted in the autumn or early spring. They can be propagated either by seeds or by offsets in the usual way. *P. maritimum* requires protection in the winter.

PANIC GRASS.—See *PANICUM*.

PANICUM (PANIC GRASS. Nat. Ord. Gramineæ).—This is a genus of hardy and half-hardy annual and perennial grasses, mostly of easy culture, though they are interesting botanically rather than good garden plants in this country. *M. colonum* is the MILLET RICE; *P. Crus-galli* is the BARNYARD GRASS; and *P. miliaceum* is the MILLET used for the feeding of fowls. *P. plicatum*, a half-hardy perennial, is sometimes grown in pots. It is elegant in habit, and grows about 2½ ft. high. *P. virgatum* is a good wild-garden plant about 4 ft. high. To give cultural details of these and other species is at present beyond our scope.

PANSY (Nat. Ord. Violaceæ).

Culture of.—The culture of the pansy is quite a simple matter, and although this old favourite has been somewhat eclipsed by the newer Tufted Pansies or Violas (see article on *VIOLA*), there are many gardeners who still grow it, and many more who wish to grow it well, hence this article.

Our first consideration in the matter of pansy cultivation is the purpose for which the plant is to be applied. It can, as is well known, be best used as an edging to herbaceous and other borders, or it may be used for carpeting, and again as a mixed plant among herbaceous subjects. Personally we prefer the neater violas as edging plants, since they are perpetual flowering, if attended to in the matter of clipping off the dead flower stems, but this cannot be said of the pansy. About the middle of July this plant invariably gets untidy. Long, leggy stems which have borne numerous flowers lie on the ground, and the plant presents a deserted appearance. Thus it is best used as an addition to the herbaceous border, from which it can be lifted and attended to when it gets untidy or past its best.

As to soil and site, the pansy is not at all fastidious. A light, well-drained loam, nicely enriched with rotten manure is quite suitable, and the position may be either in full sun or in semi-shade. Pansy culture on peat loams is not so successful as on those of a more alkaline nature, a fact which should be borne in mind by gardeners having soils inclined to acidity, in which case mortar rubble or any other form of lime should be freely dug in, prior to planting.

The planting of pansies can be done either in the spring or in the autumn; as they are perfectly hardy there need be no fear of losing any by the frost, but there is great fear of fatalities owing to pests, such as slugs and snails. Suffice it must to say here, that where the soil is full of pests, new stock should be wintered in a frame, and planted out permanently somewhere about the middle of March. As with all other subjects, firm planting is essential for pansies. The distance from plant to plant may vary, according to size, from 6 ins. to 12 ins.: planting at a distance of 3 ins. apart to make a display is not recommended, as it means that the subjects will be somewhat starved by being so close together.

Propagation.—Pansies are very easy to propagate, either by seed, division of the rootstock, or by cuttings. Seed can be sown in the open ground in a slightly shaded position from June onwards, the plants pricked out in a cold frame, wintered there, and planted permanently the following spring; or seed may be sown in heat in February, the plants being pricked out and hardened off as soon as large enough, and finally set in their permanent positions early in April. These will flower the same year. Seed is easy to save, and it can be sown as soon as ripe, but, needless to say, after seed is saved the length of the blooming period of the plants is very much curtailed.

Propagation by division is also fairly simple. The old plants, aged two years or more, are lifted and cut into three or four pieces with a sharp knife. The strongest sections are then replanted in rows in the reserve garden, 9 ins. apart each way, watered, and kept well hoed all the rest of the season. This may be done in July.

Cuttings also are easy to strike. The old plants are lifted after finishing flowering in July, and cut down to within a few inches of the ground; thus all the leggy growth is disposed of. They are then planted close together in the reserve garden or in a frame, in light soil, well soaked with water containing a little nitrogenous fertiliser, and in a very short time numerous young shoots will appear. These are cut off when about 2 ins. long, in the usual way, just below the joint, and pegged into sandy soil 3 ins. apart each way, in a lightly shaded frame. A thorough watering is given, after which the lights are closed until rooting takes place, which will be in three weeks or so. Some people plant the pansies out the same autumn, but we prefer to keep them in a frame, giving air on all suitable occasions until March, after which they are hardened off and planted out permanently.

Varieties.—The Pansies grown today are all Fancy or Belgian Pansies. They produce much larger flowers than the old Show Pansies did, and the range of colour is vastly more varied. Most of the leading seed firms make a speciality of Fancy Pansies, and have fine strains of their own of which they supply seed. Several nursery firms make a speciality of growing named varieties, and propagate them annually by cuttings. Such firms advertise from time to time, and readers should send for their lists or consult the National Pansy and Viola Society, since any selections given here would be very quickly out of date.

BEDDING PANSIES.—These may be called the remnants of the old Show Pansies, as they are mostly blue, white, and yellow selfs, with small blotches of a different colour on the lower outside petals. They are offered in seed, and are treated as seedlings for bedding, being very effective if grouped in large masses, though Violas (see article on *Viola*) are more popular still for this purpose.—E.

PANSY : Historical Notes.

The Pansy has long been a favourite in the flower garden. Poets have sung its praises since the days of Spenser, Shakespeare, Herrick, and Milton; while its popularity among the humble cultivators of the flower in our country homes and cottage gardens has earned for it all sorts of queer appellations, such as Three Faces under a Hood, Herb Trinity, Flame Flower, Pink of my John, Flower of Jove, Love in Idleness, Cuddle-me-to-you, etc. Heartsease, perhaps, is the most common of all, and the most general in use.

Certain modern writers would have us believe that the garden Pansy is a recent product, the result of about a century's work in seeding and improving the wild *Viola tricolor*. But this theory cannot hold water when we dip into the records of the past. Thompson, or Thomson, of Iver, Bucks, and Richardson, gardener to the Earl of Tankerville, both appear to have started improving the Pansy about the years 1810–13. There is every reason to suppose that then and for some years afterwards seedling raisers, by dint of hybridisation, selection, and careful cultivation, did much to improve the flower and raise it to the standard of a florists' flower.

But it is equally certain that centuries before either of these gardeners began to work on the improvement of the Pansy, the flower was known and grown as a garden flower. Up to a point it is more than probable that by cross fertilisation the Pansy had passed from its primitive form and had already become a popular favourite, for in all the old Herbals and florists' books at home and abroad the Heartsease or Pansy almost invariably finds a place.

From a summary of a paper in Swedish by Professor Wittrock of Stockholm, we learn that the name Pansy was used for the first time in 1537 by Ruellius under the Latin form Pensea. The earliest mention of *Viola tricolor* is by Brunfels (1536) and Fuchs (1542), both German writers, in whose country the Pansy has long been grown. Its popular name there is Stiefmütterchen. From the point of view of size, *Viola lutea* and *Viola grandiflora* were far superior to *Viola tricolor*, and by crossing these with others, such as *Viola Altaica*, *V. rothomogensis*, etc., there is good reason to suppose that a race of attractive garden Pansies or Heartsease was obtained and regularly grown by flower lovers long before the beginning of the nineteenth century.

The flower can be traced back beyond the days of Gerarde and Parkinson, as already indicated. Other references and figures of it under different names can be found in the *Hortus Eystettensis*, in Weinmann, in Clusius, in Matthiolus, and many more of the old botanical writers and compilers of Herbals. Sometimes we meet with it as *Viola flammea*, at others as *Flos Trinitatis*, *Jacea Trinitatis*, Pensée, or the like.

We cannot in the limited space at our command deal fully with the many references to the Pansy by the poets, botanists, and floriculturists of the olden times. A few brief references must suffice to show that it had a considerable hold on the minds of our forefathers who took an interest in the flower garden. Thus John Evelyn in his *Kalendarium Hortense* (3rd ed. 1669) refers to "Pansys" and "The Yellow Mountain Heartsease." Pierre Morin, an eminent Parisian florist, whom Evelyn visited on one of his journeys abroad, in a little handbook on the culture of flowers published in 1670, refers to "Pensées" in his list of fibrous-rooted plants generally to be found in the pleasure garden.

Joseph Carpenter in 1717, in his edition of *The Retir'd Gardener,* heads a chapter "Of Pansies," in which the culture and description are given.

Leonard Meager's *New Art of Gardening,* dated 1718, includes Heartsease under the heading of "Flowers blooming this Month" (August); and to carry our dates on still further we find that Stevenson in *The Gentleman Gardener,* published in 1766, says "Pansy or Heartsease is also by some called *Viola tricolor,* on account of the three colours that are in this flower."

Many more might be quoted more or less fully had we the space at our disposal. We will conclude with one as late as 1800, when Charles Marshall in his *Plain and Easy Introduction to . . . Gardening* mentions the "Hearts Ease or Pansey, large Dutch, &c., a variety."

From this date, or shortly afterwards, the Pansy was seriously taken in hand by English florists, of whom Thompson, or Thomson (the spelling of the name is uncertain), was one of the leading pioneers, and it is beyond question that a great impulse was given to its cultivation in this country by him and other raisers during the early part of the nineteenth century.

Exhibitions of Pansies were instituted throughout the United Kingdom, and by dint of skilful culture that peculiar form at one time so much appreciated and known as the Show Pansy was finally evolved. The principal sections in the old days were the Show Pansies, comprising four types: the dark selfs, the white or yellow selfs, the yellow grounds, and the white grounds. These latter, with their blotch and belting, were subject to very severe rules. The Fancies were a section distinguished by a different marking; but there are to-day but few growers who are interested in these peculiarities and rigid distinctions of the old school of florists.

The Viola or Tufted Pansy, now so generally appreciated for bedding purposes, is a race apart and of more modern production. Cross fertilisation and hybridisation by such famous growers as Dr. Stuart, James Grieve, John Baxter, and others has resulted in a type of far greater utility for garden decoration than its precursors. It may be observed that in the production of the bedding Viola or Tufted Pansy the species known as *Viola cornuta* played a considerable part.

Later still than the Viola, commonly so called, is the *Violetta,* a section of miniature pansy-like flowers, very dwarf, and also the progeny of a cross by Dr. Stuart in which *Viola cornuta* was used. For rockwork this section has much to recommend it.—C. H. P.

PANTHER CAP.—See HARMFUL FUNGI in *FUNGI: EDIBLE AND HARMFUL.*

PANTHER LILY (*Lilium pardalinum*). See *LILIES* and *WATER GARDEN: PLANTS FOR THE.*

PAPAVER.—See *POPPIES,* and under OPIUM POPPY in *MEDICINAL HERBS.*

PAPER AS GLASS.—See *GLASS SUBSTITUTES.*

PAPER BIRCH (*Betula papyrifera*).—See *TREES.*

PAPER MULBERRY (*Broussonetia papyrifera*).—See *TREES.*

PAPER WHITE NARCISSUS (*Narcissus Tazetta papyraceus*). — See *NARCISSUS SPECIES.*

PARADISE STOCK. — See under STOCKS USED in *FRUIT CULTURE, HARDY: GENERAL CONSIDERATIONS.*

PARADISEA LILIASTRUM.—See *ST. BRUNO'S LILY.*

PARAFFIN EMULSION.—This is not used now to any large extent by the best gardeners.

PARAFFIN JELLY. — See *INSECT PESTS: GENERAL METHODS OF DESTRUCTION.*

PARAGRAMMA.—Now included in the genus POLYPODIUM, for which see *FERNS AND FERN GARDENING.*

PARASITES. — See *FUNGOUS DISEASES.*

PARASOL DE ST. JULIEN (*Populus tremuloides pendula*).—See *TREES.*

PARDIA.—See under ROSE GRUBS in *INSECT PESTS.*

PARIETARIA (PELLITORY. Nat. Ord. Urticaceæ).—This is a genus of perennial weeds bearing pale purple flowers in June, which is to be avoided rather than cultivated. *P. officinalis* (Syn. *P. diffusa*) was once much used in herbal medicines for cases of stone, but PARSLEY PIERT (see article on *MEDICINAL HERBS*) now seems to have taken its place.

PARIS (HERB PARIS. Nat. Ord. Liliaceæ).—Two species of this figure in the *Kew Hand-list of Herbaceous Plants.* These, *P. polyphylla* and *P. quadrifolia*, are hardy herbaceous perennials of the simplest culture, with greenish flowers in May, on plants 6 ins. high. They are only worth growing in very large collections, and it is well to note that they are no longer of much importance as medicinal plants.

PARIS GREEN.—See under COPPER ACETO-ARSENITE in *COPPER AND CUPRUM COMPOUNDS*; and also *INSECT PESTS: GENERAL METHODS OF DESTRUCTION.*

PARLOUR PALM.—See *ASPIDISTRA.*

PARNASSIA (GRASS OF PARNASSUS. Nat. Ord. Saxifragaceæ).—All the species of this genus are usually regarded as water or bog plants, but that is not the case. *P. asarifolia* (Syn. *P. nudata*) and *P. caroliniana* (Syn. *P. americana*) will succeed in ordinary or rock borders which are kept very moist, and which are shaded from strong sunshine. They both bear white flowers in May, are hardy herbaceous perennials, and average about 6 ins. in height. The two best sorts for the water garden are described under GRASS OF PARNASSUS in our article on *WATER GARDEN: PLANTS FOR THE.*

Rock Garden Species. — These include some perennial bog plants of tufted habit suitable for the moister parts of the rock garden. They may be propagated by division of the roots in the spring, or by seeds sown in March in a little heat. *Parnassia palustris*, referred to in the above named article, is the best. It bears leaves in tufts, and white flowers on erect stems. It succeeds in an open site in boggy or peaty soil, flowers from June to August, and averages 6–9 ins. high.

PARROT TULIPS.—See *TULIPS.*

PARROTIA.—For the best species see *SHRUBS.*

PARSLEY (*Carum Petroselinum.* Nat. Ord. Umbelliferæ). — No vegetable garden is complete without its rows or beds of Parsley, as the plant is a universal favourite for garnishing and for the making of Parsley sauce. The idea that it is difficult to grow has little foundation in fact.

Culture.—If an abundant supply of large, well-curled leaves is wanted, this need not be expected if the plant is relegated to any old corner or set in soil of indifferent quality. A rich, well-worked soil, free from lumps of recently applied manure, is the best, and the site, while fairly open, should not be fully exposed to the glare of midday sun.

Sow the seed either broadcast or in drills—the latter for preference—and cover lightly with soil. Pay a good price for the seed to be sure of getting new stock, as old seed germinates very badly. Sowings may be made outside from March to May, and indoors or in frames during February and September. In any case, the seedlings should be thinned out so that they stand 9 ins. apart each way, and the hoe should be kept going throughout the season for the dual purpose of killing weeds and stimulating growth.

Parsley transplants fairly well, provided water be copiously supplied after this has been done. Plants should be put 9–12 ins. apart, and form suitable subjects for edgings to vegetable borders. Weak liquid manure will be necessary if plants of very high quality are required.

If a supply is wanted in the winter, a cold frame should be put up in a sheltered position in the garden, and this filled with September-sown plants from another frame, putting them 3–6 ins. apart each way. Care should be taken to keep the frame well covered in during frosty weather.

Varieties.—Numerous strains are offered in seedsmen's lists, but none are better than the following: Champion Moss Curled, Clibran's Exhibition, Double Curled, Dwarf Fern-leaved, Hardy Winter, Myatt's Garnishing, and Triple Curled.—E.

See also *CARUM* and *ORNAMENTAL VEGETABLES*.

PARSLEY BREAKSTONE.—See under PARSLEY PIERT in *MEDICINAL HERBS*.

PARSLEY, FOOL'S. — See FOOL'S PARSLEY in *WEEDS*.

PARSLEY-LEAVED BLACKBERRY. See *BRAMBLES AND BERRIES*.

PARSLEY-LEAVED THORN (*Crataegus apiifolia*).—See *TREES*.

PARSLEY PIERT.—See *MEDICINAL HERBS*.

PARSNIP (*Peucedanum sativum*. Nat. Ord. Umbelliferæ).—This is one of the most accommodating of all crops we grow in this country, and, on account of its great food value, deserves to be even more largely grown. Fortunately for the town gardener, the plant is not at all fastidious in its requirements; land on which other crops fail invariably proves profitable sown with parsnips.

Culture.—Extra heavy or clayey soils will be improved by the addition of a fair quantity of finely sifted ashes or road scrapings. Where the soil is light and a proper system of cropping has been observed, seeds of any variety mentioned below will give roots of excellent quality, perfect in size and appearance, on land well manured twelve months before.

Seed must be sown as early in the year as the state of the soil admits; therefore prepare the bed in good time,—the sooner the better,—double digging or double trenching it if possible.

In sowing the seed, instead of filling the row, seed will be economised and labour saved if it is dropped not more than three in a place at intervals of 9 ins. Should more than one of these germinate, remove the surplus as soon as the strongest can be selected; these, if carefully lifted, will bear transplanting elsewhere. Cover seeds with an inch of soil, leaving the rows 1 ft. asunder. The occasional use of the hoe between the rows of plants is advisable for the dual purpose of stimulating growth and keeping weeds under for the season.

Beyond this no further attention

need be given until the early days of November, when two courses are open to the grower. He may lift the whole crop and store as advised in article on *CARROT*, or allow it to occupy the ground until required for use. This latter method, although assuring the best table quality, has the disadvantage of being likely to cause considerable inconvenience should the winter be exceptionally severe, or snow render the location of the roots difficult.

Varieties include Hollow Crown, Large Guernsey, Marrowfat, New Century, New Maltese, Student, Tender and True.—F. R. C.

PARSNIP CANKER.—See *DISEASES OF PLANTS*.

PARSNIP FLY.—See under CELERY FLY in *INSECT PESTS*.

PARSNIP-ROOTED CHERVIL.

This, sometimes known as TURNIP-ROOTED CHERVIL, can be boiled and used similarly to Parsnips. The crop is but little grown on account of the fact that the best results can only be obtained by sowing early in heat. Really the crop has but little to commend it, as it is not nearly so good as a well-grown Parsnip.

PARSNIP-ROOTED PARSLEY.

This, also known as HAMBURGH PARSLEY, is a comparatively little known vegetable in this country. It may be grown in much the same way as other long-rooted crops in deep, well-worked soil, though it cannot be said to be as good a vegetable as the true Parsnip.

PARSNIP WINE.

Although most people who grow parsnips do so in order to be assured of a good wholesome vegetable for winter use, there are others, notably in many country districts, who, being aware of the health-giving value of the Parsnip, sow an abundance of the crop for making Parsnip Wine. The writer of this note had the pleasure of working daily in the garden for a period of fourteen years with an old villager to whom wine, made according to the recipe below, had been his chief drink (save, of course, the usual daily non-intoxicating beverages) for nearly seventy years. No matter from what ailment his wife, self, or neighbours may be suffering, a good glass of Parsnip Wine is the remedy, and if my information was correct, and I have no reason to doubt it, the prescribed drink invariably had the desired effect; and although not exactly non-intoxicating, I have his word for it that it would take a great deal to make a man lose his head.

How to Make it.—To every pound of well-washed parsnips add a quart of water, preferably that which has been boiled. Cut the roots up into quarters, place them in a large boiler, and boil slowly until really soft. Strain the liquor through a fine sieve or piece of muslin, adding sugar (Cane or Demerara sugar is the best), at the rate of three pounds to each gallon of water. Let this stand overnight in a large earthenware pan or clean wooden tub covered with a clean cloth.

The day following, add a quarter of a pound of brown ginger to each four gallons of liquid, also a good-sized handful of hops (either fresh from the hedge where they grow wild, or dried as obtained from the chemist or grocer), placing these in a loose muslin bag.

Next get a slice of bread nicely toasted; upon this put a heaped tablespoonful of fresh yeast, or its equivalent of the prepared article usually obtainable from the baker, and add this to the "wine."

When the liquid is seen to be working freely, place in a wooden keg, or in very strong stone jars, corking these securely, afterwards standing in a cool place.

Glass bottles should not be used, for if very warm weather follows and the storage is not cool the wine will "work" so freely that either the corks blow out or the bottles burst.

Whenever possible, keep the liquid at least six months before use, for the older it is the clearer and stronger it becomes.—F. R. C.

PARTRIDGE BERRY (*Gaultheria procumbens*).—See *SHRUBS*.

PARTRIDGE MANURE.—See *POULTRY MANURE*.

PASPALUM (Nat. Ord. Gramineæ). This is a genus of hardy and tender grasses of small value and easy culture. The two most important species are *P. pubiflorum* and *P. virgatum*, both known as BASTARD MILLET, averaging 1½ ft. in height. MILLET (True) is referred to in our article on *PANICUM*, to which genus it belongs. The plant under notice must not be confused with it.

PASQUE FLOWER (*Anemone Pulsatilla*). — See *ANEMONE: ROCK GARDEN SPECIES*, and *MEDICINAL HERBS*.

PASSIFLORA.—For best species see *CLIMBING AND TRAILING PLANTS*.

PASSION FLOWER.—See *TACSONIA*.

PASSION FLOWER (*Passiflora coerulea*). — See *CLIMBING AND TRAILING PLANTS*.

PATHS.—See *GARDEN PATHS*.

PATIENCE DOCK (*Rumex Patientia*). See *RUMEX*.

PAULOWNIA.—For the best species see *TREES*.

PAVED PATHS: ROCK PLANTS FOR. — See ROCK PLANTS FOR PAVED PATHS in *ROCK PLANTS FOR ALL PURPOSES*.

PEA.—See *PEAS* and *PISUM*.

PEA AND BEAN SEED BEETLES and PEA AND BEAN WEEVILS.— See *INSECT PESTS*.

PEA, EDIBLE PODDED or SUGAR.— See *SUGAR PEA*.

PEA-FRUITED RETINOSPORA (*Cupressus pisifera*).—See *TREES*.

PEA MILDEW.—See *DISEASES OF PLANTS*.

PEA STREAK.—See *DISEASES OF PLANTS*.

PEA TREE.—A name applied to the genus CARAGANA. See *SHRUBS*.

PEA TRIBE.—See *KINDS OF CROPS*.

PEACH DISEASES.

The following three Peach diseases are of interest and importance to growers of this fruit.—EDITOR.

Peach Leaf-curl (*Exoascus deformans*). — This disease is very common on outdoor peaches. It affects the young leaves and shoots, which become puckered, twisted and thickened, and blotched with pink. Severe cases cause defoliation, loss of crop, and injury to the tree. Cool, damp weather favours the disease.

REMEDIES.—Spraying with 2 per cent. Burgundy Mixture (see article on *SPRAYING MIXTURES*), with the addition of a little milk to make the spray adhere to the leaves, has been found very efficacious. It is essential that the spray should be applied *before* the leaf buds open, *i.e.* usually about the middle or end of February, and as a rule one spraying is sufficient. All dead twigs should be removed, and diseased parts cut out and burned.

Peach Mildew (*Sphaerotheca pannosa*).—This forms a white, mealy coating on the young leaves and shoots of the peach, often checking their growth and causing defoliation. It also attacks the fruit.

REMEDIES.—Dusting with sulphur is the best treatment in this country. The powder should be applied early before the disease becomes serious, and repeated till it is thoroughly under control.

Peach Shot-hole.—The leaves of various fruit trees, especially peach, are often found to possess small, circular holes. These were formerly thought to be due to the fungus *Cercosposa circumscissa*, but recent observations show that this is seldom the case, and indicate that they may be due to the action of the tree itself excising portions of tissue which have been injured by insect bites, scorch, or other agency. No remedy is known.—A. D. C.

PEACH LEAF-CURL.—See *PEACH DISEASES.*

PEACH MILDEW. — See *PEACH DISEASES.*

PEACH NETTING. — See *GARDEN NETTING.*

PEACH SCALE.—See under BROWN SCALES in *INSECT PESTS.*

PEACH SHOT-HOLE.—See *PEACH DISEASES.*

PEACHES (*Prunus Persica.* Nat. Ord. Rosaceæ).—These delicious fruits are extensively grown under glass, the success or failure of which depends upon the different details of management being carried out at the proper time, and no dessert from May to October is considered complete without them. Nothing could give more pleasure than a house full of ripe fruits, and no country can equal the delicious fruits grown in England. Span-roofed and lean-to houses, the former running north to south, the latter facing south or south-west, are the most suitable, and a nice light lean-to is the best for early forcing. Another advantage now in early forcing is the command of the new varieties of recent introduction, which ripen the fruit much in advance of the older varieties. Size of houses must be regulated according to demand; 18–20 ft. in length, and not less than 15 ft. in width, should be allowed for each trained tree, with sufficient hot-water pipes to keep up the requisite temperature without getting the pipes too hot. Pot-peaches are the best for early forcing; a span-roof house will hold the most trees; space allowed will be according to the size of the tree, selecting varieties according to requirements. Success depends a good deal upon the way the trees are potted and the compost used. A fairly heavy loam should be selected; generally speaking, two-thirds should be loam. Lime must be supplied in some form, by lime-rubble, old plaster, or broken chalk; also add some charcoal and burnt ashes, with 10–15 per cent. of bonemeal. Although annual pottings are not often recommended, and the trees fruit well for two seasons, our experience is they fail the third, and for all practical purposes the soil is exhausted after one season's growth owing to the small size of the pot. Use clean pots carefully crocked; and with the soil in a medium state of moisture, it is almost impossible to pot too firm.

Disbudding.—Pruning and pinching can only be successfully carried out by experience, as peaches and nectarines, like other trees, vary considerably both in habit and growth. If ripe fruits are required in May with such varieties as *Cardinal*, *Duke of York*, *Early Rivers*, and *Peregrine*, the house need not be closed till January. Allow the house to start gradually, 40° F. at night as the minimum and 48° F. as the maximum, with free ventilation till they reach the flowering stage on all favourable occasions. Do not exceed 50° F. at night until after the stoning period. A circulation of warm sweet air must be procured in damp weather by artificial means and careful ventilation.

Permanent Trees.—Unless natural draining is satisfactory, artificial drainage must be provided, as the peach requires abundance of water throughout the growing season. After deciding on the level, excavate about 3 ft. below the surface; prepare drains and drainage in a similar manner to that recommended for vines, allowing for 2 ft. of compost. The piecemeal system of making the border is the best, and 6 ft. by 4 ft. for two- or three-year-old trees will be wide enough. Loam of a rather strong calcareous nature should form the main staple; chop up roughly, add lime and brick rubble, burnt earth, and road scrapings—one or all may be used, or the most convenient. No fresh manure is needed, but half a bushel of bone-meal and half a bushel of ½-inch bones with a peck of soot may be added to each cartload. In a wet subsoil the border should be raised above the ground level. Make it firm and allow it to settle down, after which planting is a simple operation. Spread out the roots in every direction, cut off damaged points, and work the soil well in amongst the roots, 4 ins. above the roots being ample. Give the tree a good watering with a rosed-can to settle the soil amongst the roots. Large trees if prepared may be planted at almost any season, but when prepared and planted early in the year will carry a fair crop of fruit the first season. Water well, and mulch with short manure; keep the house cool, tying the tree rather loosely for settling down. Moisture becomes necessary when closed, and must be supplied by syringing and damping of the paths, etc., until the trees are in flower, when a drier and warmer air is recommended, although through this stage moderate moisture should be supplied by damping the floors on fine days. After the fruits are set, regular syringing twice a day on fine days should be given, but always in time for the foliage to become dry before nightfall.

Training.—The fan system of training is the best, although Peaches answer to the cordon system equally well. A healthy tree produces a great number of superfluous buds, which have to be removed to prevent a tangle of shoots. It is necessary, after the tree is formed, to keep it evenly furnished with annual shoots for succession. Vigorous trees are always ready for disbudding first, and should have a few foresight shoots removed as soon as the fruits are set. Continue to remove other shoots at short intervals, selecting a well-placed shoot near the base, others 15–18 ins. apart, and the terminal bud for future extension. After the trees are making free growth, tie in the shoots neatly with soft matting to secure a straight branch after the bearing shoot is cut away. Avoid retaining more shoots than are required to furnish the tree. Gradually thin the fruits, commencing when they are the size of peas, again when they attain the size of nuts, leaving a small surplus to allow for any loss during stoning. After stoning is completed the final thinning should take place, leaving all the best-placed fruits on the upper side of the shoots, removing all as far as possible underneath. A great difference of opinion exists as to the number a tree may carry. One to every square foot is near enough for large peaches, and one to every hundred square inches for nectarines.

Fertilisation.—As a rule, when other conditions are right, plenty of fruit sets without artificial aid; still, all early houses should be gone over with a brush from one tree to the other, and repeated from day to day until the latest begin to drop their petals.

Watering.—Trees when inside

require continuous supplies of water, but no rule can be laid down, as so much depends upon the elevation, formation, and depth of the borders. The roots should never be allowed to become dry, otherwise failure is sure to follow, and the quantity of water must be regulated by the age and condition of the trees, as also must the use of stimulants. Use soft water in supplying moisture by syringing and damping. Fumigate the house just before the flowers open, and again after the fruits are set, or at any later date if fly is troublesome, and discontinue syringing when the fruits are ripening.

Ventilation and Temperatures.—All stone fruits require plenty of ventilation, especially through the early stages, and including the setting, stoning, and colouring of the fruits. Time must be given by starting them at a low temperature; 45° F. is high enough with artificial heat to start with; in mild weather it will be higher with ventilation. Commence with 45° F. to 50° F., increasing to 50° F. at night when the blossoms open, and 60° F. by day; after the fruits are set, 56° F. to 60° F. at night, with 10° higher on fine days. Later houses must be regulated by external conditions, always with a chink of air on top and front ventilation.

VARIETIES TO GROW.

Bellegarde.—A fine large peach of excellent quality.

Duke of York.—The finest early peach for forcing.

Dymond.—A highly coloured hardy and prolific peach.

Goshawk.—A large pale-coloured peach of fine flavour.

Peregrine.—A handsome fruit, excellent for all purposes.

Princess of Wales.—A rich and beautiful late peach.

There are many other good varieties which may be included in large establishments, such as Alexandra Noblesse, Grosse Mignonne, Royal George, Stirling Castle, and Thomas Rivers.

Nectarines.—The same cultural remarks as recommended with regard to peaches apply to these fruits. Nectarines have a smooth skin and peaches a rough one.

VARIETIES TO GROW.

Dryden.—A large high-coloured and fine-flavoured nectarine.

Early Rivers.—The best early forcing, excellent for all uses.

Humboldt.—A large handsome fruit of fine quality.

Lord Napier.—A large, reliable, and excellent variety.

Pineapple.—A large, high-coloured, very rich, deep orange fruit.

Victoria.—A late greenish-yellow fruit of fine flavour.

Other good varieties are:—Darwin, Improved Downton, Newton, Rivers' Orange, Spencer, Stanwick, and Violette Hâtine. F. J.

PEACHES: Outdoor Culture.—See *NECTARINES AND PEACHES: OUTDOOR CULTURE.*

PEACOCK DUNG.—See *POULTRY MANURE.*

PEACOCK POPPY (*Papaver pavoninum*).—See *POPPIES.*

PEACOCK TIGER IRIS (*Tigridia Pavonia*).—See *TIGER IRIS.*

PEAR (*Pyrus.* Nat. Ord. Rosaceæ). — **Culture of.** — If the reader will study the general considerations on Hardy Fruits included in this work, he will agree with us that no lengthy detailed article on the Pear is necessary here. The culture of the pear and the apple are very similar, and can be carried out without difficulty by any gardener who has digested our general considerations.

Therefore, it will suffice to say

here that of the two stocks on which pears are grafted, the free or seedling Pear stock is in most demand for espaliers, pyramid trees, and standards, while the Quince is the stock used for grafting when smaller trees are required, *i.e.* when the gardener wishes to grow bush pears, cordon trees, and smaller pyramid specimens. It is well to remember that it is not every variety of pear that will thrive when grafted on the Quince stock; the most notable failures being found in *Beurré Bosc*, *Blickling*, *Passe Crasanne*, and *Souvenir de Congrès*, our hardy fruit contributor informs us. The following selection contains the cream of the varieties, arranged in the months during which they ripen.—EDITOR.

DESSERT PEARS.

September:—*Jargonelle.*—Medium size. Growth free and weeping. Best as a standard or wall. Gather before quite ripe or the fruits become mealy. A juicy and refreshing sort.

William's Bonchretien.—Large, too well known to need description. Succeeds in any form. Gather as for *Jargonelle.*

October:—*Conference.*—Large, russety; a handsome long fruit. Compact growth, very free and constant bearer. Rich, spicy flavour. Splendid.

Louise Bonne (*of Jersey*).—Medium size. Deep crimson cheek. Compact growth; free bearer. Very juicy and sweet.

Marguerite Marillat.—Very large, yellow. Compact erect growth, and good as a cordon. Unsuitable for espalier culture, but makes a close bush. Of the richest perfumed flavour.

November:—*Doyenné du Comice.*—Large, rich golden with russet. Good in all forms—quite the finest of all pears. Juicy, very sweet, rich, and melting, with no grit. Moderate bearer.

Durondeau.—Very large and long. Russety, dark brown. Flavour very rich. Growth compact but free. Good in any form. Constant, reliable bearer.

Emile d'Heyst.—Large, yellow, spotted. Compact growth, good in any form. Flavour rich; juicy, melting flesh. Beats *Marie Louise.* Very free bearer.

Fondante de Thirriot.—Large, globe-shaped. Great bearer in any form. Very rich flavour, juicy, and refreshing. First rate.

Marie Louise.—This old favourite is included, but should only be placed on wall or fence.

Pitmaston Duchess.—Very large, deep yellow. Good in any form, bearing freely. A rich, juicy dessert fruit in warm seasons; but otherwise it is second rate; though then is grand for bottling or stewing. Flavour sweet, with acid tannin taste. Keeps fit for use into November. Good on wall.

December to April:—*Bergampt d'Esperen.*—Medium size, green, round, with long stalk. Bears so freely as to require severe thinning. Flavour rich, juicy.

Glou Morceau.—Large green, compact grower. Good bearer. A rich, juicy variety for warm soils or wall only.

Josephine de Malines.—Small, compact grower. Succeeds in any form, and lasts a long time in use. Very rich, aromatic flavour. Free bearer.

Nouvelle Fulvie.—Large, but awkwardly shaped. Rich brown, russety colour. Fair bearer, and one of the most reliable pears.

Further Kinds.—The following sorts may also be strongly recommended to growers who desire further variety:—

For September.—Aspasie Aucourt, Colmar d'Eté, and Souvenir du Congrès. This last is a failure on the Quince stock.

For October. — Beurré Hardy, Beurré Superfin, and Fondante d'Autômne.

From December to April.—Beurré de Naghin, Doyenné d'Alençon, Duchesse de Bordeaux, Easter Beurré, Knight's Monarch, and Winter Nelis.

PEARS FOR BAKING AND STEWING.

Bellissime d'Hiver. — Large; growth very sturdy and upright. Makes a good cordon or bush. Bears freely, and cooks to a sweetmeat.

Catillac.—Large, round, succeeds as a standard or on east or north wall; the growth is too awkward for bush culture. Good bearer, keeping till June.

Uvedale's St. Germain. — Often grows to 2 lb. in weight, and although large, it cooks well. Best on a wall. Moderate bearer, keeping till June.

Late Dessert Pears. — The late Dessert pears mentioned in this article need special care. The trees should be well mulched and fed while growing, and the fruit should be left on the trees well into November to perfect growth. They should be stored in a cool place, and as they commence to ripen, a few at a time should be brought into a warm place—this brings out their flavour. As mentioned in another article, they are of no use unless the garden has a proper Fruit House.—G. B.

PEAR AND CHERRY SAWFLY.—See under SLUGWORM in *INSECT PESTS.*

PEAR LEAF BLISTER MITE and **PEAR LEAF BLISTER MOTH.**—See *INSECT PESTS.*

PEAR LEAF CLUSTER CUP.—See *DISEASES OF PLANTS.*

PEAR MIDGE.—See *INSECT PESTS.*

PEARL-ASH.—See under POTASSIUM CARBONATE in *POTASH AND POTASSIUM COMPOUNDS.*

PEARL-WORT.—See *SAGINA.*

PEAS (*Pisum sativum.* Nat. Ord. Leguminosæ).—A kitchen garden without its rows of peas is unthinkable, and thanks to the efforts of modern raisers the cultivation of really profitable varieties is no longer restricted to those having large breadths of good, deep soil, upon which it is usual to grow numerous rows, the haulm of which approaches 6 ft. or more in height. Many of the most prolific varieties, possessing exceptional good table quality, are found among those which rarely exceed half the height just mentioned. The tall sorts, though much heavier croppers, and greatly in favour with professionals, are unsuitable for small gardens: first, on account of the difficulty in obtaining suitable sticks for the support of the haulm; and secondly, since they grow so high that they shade the land very much and make it quite unsuitable for other crops. Readers who can get good sticks should certainly try one or more of the newer tall-growing varieties; for even without adopting what is termed Exhibition culture the length of the individual pods, size of pea, and enormous crop will be a revelation to those who know only varieties introduced even twenty years ago.

Preparation of Land.—Almost any soil may be brought into a condition suitable for sowing either early, maincrop, or late peas. Heavy soils need deeply trenching, plenty of long, strawy manure being added late in winter; others of a light nature needing a liberal supply of well-decayed cow manure to be dug in early in the year.

Whenever possible, prepare a

portion of the garden especially for this crop, letting it be of sufficient width to accommodate every row sown from early spring until midsummer.

By thoroughly trenching the whole plot in the winter, much labour will be saved at a period when it can least be spared. The results obtained will be far better than when the time-honoured plan of getting out the drills for these a few days before it is intended to sow the seed is adopted. If trenching is decided upon, very little more manure will be needed, yet the crop taken from each row sown will be twice as heavy as that which follows sowing in a hastily prepared trench.

Sowing.—In former days the chief reason why many failed to get the best results from peas was the common failing of sowing a quart of seed where less than half the quantity would suffice. Thin sowing may be said to be one of the secrets of success.

Owing to the superior flavour of the wrinkled, or marrowfat varieties, it is no longer advisable to sow seed of a round-seeded variety in the autumn in order to get an extra early dish; far better defer such sowings until the following year, and select good, early marrowfats which are not only of superior table quality and far heavier croppers, but if all goes well, produce may usually be had from these rows as early, or even earlier, than from autumn-sown rows. The time of sowing largely depends on local conditions, it being unwise to risk the loss of valuable seed too early, or while the soil is in a pasty condition. Generally speaking, on light soils the first sowing may be made about the middle of February, three weeks later being soon enough for soils of a retentive nature.

To succeed the early sown, more seed should be got in every fortnight until the end of May. For these sowings any of the later varieties recommended at the end of this article will give good returns. Sowings made in June should be limited to those varieties mentioned for earliest sowing. A pint of good seed will be ample for a row of 60 ft. long; in fact, sowings made during the month of May should be even thinner than this.

A great point to observe is, to give the haulm proper support early in growth. This may be done by placing twiggy sticks to the rows as soon as the plants appear above the soil, and others about a foot above the average height of the variety, before the tops fall over.

Watering and Mulching.—Plenty of moisture must be given during dry weather, but avoid the use of liquid manure until the first pods are swelling freely. Syringe overhead after a hot day, and if the peas promise to be backward, cut away a few inches from the tops as soon as the first flowers open. As the practice involves considerable loss, its general adoption is not advised. A good mulch of manure or lawn mowings laid along the sunny side of the row during very hot weather will keep the roots moist, and economise time in watering.

Varieties:—*For Earliest Sowing.*—Clibran's Masterpiece, English Wonder, Harbinger, Hundred-Fold, Laxtonian, Little Marvel, Peter Pan, Pioneer, Primo.

Second Early.—Duchess of York, Duke of Albany, Duke of York, Essex Star, Gradus, Marrow, Senator, Stourbridge Marrow, Stratagem, The Daisy, The Jap, The Lincoln, World's Record.

Main Crop.—Essex Wonder, Eureka, Glory of Devon, Hercules, Lancastrian, Passport, Peerless, Superlative, and The Bell.

Late Crop.—Autocrat, Dreadnought, Late Queen, Michaelmas, Ne plus Ultra, Rearguard, and The Gladstone.

Large Pods.—Centenary, King George, Quite Content, and Victory.

F. R. C.

UP-TO-DATE SELECTIONS.

Bedford Champion.—Early.
Benefactor.—Early.
British Lion.—Early.
Early Morn.—First early.
Daffodil.—First early.
Eight Weeks.—First early.
Giant Stride.—Very large pods.
Dark Laxtonian.—Early.
Greenmantle.—Early.
Kelvedon Wonder.—Early.
Laxton's Superb.—First early.
Meteor.—Early.
Mid-Somerset Wonder.—Early.
Moidopper.—Early.
Monster Pea.—Maincrop.
Premier.—Second early.
Progress.—Early.
Royal Salute.—Maincrop.
Exhibition.—Second early.
First-Comer.—First early.
Milestone.—Midseason dwarf.
New Dwarf Exhibition. — Dwarf second early.
Universal.—Dwarf wrinkled.
Wonder.—Dwarf second early.
St. Albans Wonder.—First early.
Superb.—Early.
Best of All.—Maincrop.
First of All.—First early.
Late Gem.—Late maincrop.
Magnum Bonum.—Maincrop.
Majestic.—Second early.
Phenomenon.—Second early.
Prizewinner.—Second early.
Supreme.—Second early.
Thomas Laxton Improved.—Early.
Timperley Wonder Improved.—Early.
Autocrat.—Late crop.
Perfection.—Late maincrop.
New Advancer Marrowfat. — Second early.
New Early Favourite.—First early.
New Early Wonder.—First early.
New Leader.—First early.
New Pioneer.—First early.
New Surprise.—First early.
Prizetaker Marrowfat.—Late crop.
Senator.—Maincrop.
What's Wanted.—Early.

PEAS AND BEANS : SAVING SEED OF. See under VEGETABLES in *SEED SAVING.*

PEAT.

For Rhododendrons, Azaleas, Ericas, and other hard-wooded plants, peat is essential, whether they are grown out of doors or in pots. It should be bed peat if got from the moors, and heath mould if got from heaths and commons. Bed peat is very different from bog peat; the latter is fully charged with water and poisonous vegetable acids, and should never be used.

When using peat for the formation of new borders for the three above-named plants, do not put it on in great lumps and turn these in. Chop the peat up and mix it with half its own volume of semi-rotted stable manure, and dig the mixture in freely, as you would in the case of ordinary manure. Established bushes can also be mulched with chopped peat.

When using peat as an ingredient of potting soils, rub it through a ½-inch sieve and mix thoroughly (see *COMPOSTS*). As peat absorbs water readily, that which is intended for composts should be stacked under cover to protect it from rain.

Peat is also useful for certain rock plants, and plants popularly known as American plants. Readers are referred to separate articles dealing with these subjects.—E. T. E.

PEAT-LOVING ROCK PLANTS.—See ROCK PLANTS REQUIRING PEAT in *ROCK PLANTS FOR ALL PURPOSES.*

PEAT-MOSS LITTER. — See *HORSE MANURE.*

PECAN (*Carya olivaeformis*). — See *TREES.*

PEGANUM.—See *SYRIAN RUE.*

PEGGING-DOWN: ROSES FOR.—See under ROSES FOR PEGGING-DOWN in *ROSES FOR ALL PURPOSES.*

PEGOMYIA.—See BEET FLY in *INSECT PESTS.*

PELARGONIUMS (Nat. Ord. Geraniaceæ). — Florists' section, greenhouse herbaceous perennials, 1–2 ft. high, succeeding in a compost of fibrous loam, leaf-mould, and a little rotten manure. They are propagated by cuttings, the raising of seedlings being practically left to specialists.

Culture. — Cuttings should be chosen from well-ripened shoots in August or September, and inserted in sandy soil in pots or boxes where they will soon root if kept close for a week or two. In a month or six weeks they are ready for removal, and should be set singly in small pots in which they are wintered. Little water is required during this period, but they should not be coddled too much, or the plants will become spindly and weak.

The old Show or Fancy Pelargoniums have almost gone out of cultivation, the modern Florists' Pelargoniums belonging to the Zonal and Regal sections. The former are used both for summer bedding and for greenhouse decoration, the latter almost exclusively as greenhouse plants. Both species flower over a long period, and with proper treatment bloom can be had throughout most of the year.

Varieties:—*Zonal.*—General Joffre, Henry Jacoby, Lady Curzon, Lady Warwick, Mauretania, Maxime Kovalesky, Mrs Brown Potter, Mrs Robert Cannell, Paul Crampel, Phyllis, Snowdrop, The Sirdar.

Regal. — Attraction, Bridesmaid, Dairymaid, Duchess of Teck, Edward Perkins, Exmouth Rival, Loveliness, Magnificent, Market Favourite, Martha Bouchier, Mrs W. J. Godfrey, Ruby Acquisition.—J. L. G.

NEW VARIETIES.

Pelargonium crispum variegatum.—A variegated sport with densely arranged grey-green, silver-margined leaves, and a compact habit. The flowers are inconspicuous.

P. Whiteknights's Glory.—A new Zonal, bearing large trusses of single orange-salmon flowers. It is splendid for bedding.

PELARGONIUMS FOR CITY GARDENS. See under BEDDING PLANTS in *TOWN AND CITY GARDENING.*

PELLÆA.—For the best species see *FERNS AND FERN GARDENING.*

PELLITORY.—See *PARIETARIA.*

PEMPHIGUS.—See LETTUCE ROOT APHIS in *INSECT PESTS.*

PENICILLARIA.—Now included in the genus *PENNISETUM.*

PENNISETUM (Nat. Ord. Gramineæ).—This is a genus of annual and perennial grasses not quite hardy. The best species, *P. longistylum,* known to florists as PLUME GRASS, is referred to in our article on *ORNAMENTAL GRASSES.*

PENNY CRESS. — See *CRESS* and *THLASPI.*

PENNYROYAL, or PENNY-ROYAL (*Mentha Pulegium*).—See *MENTHA* and *POTHERBS.*

PENNYWORT.—A name applied to *COTYLEDON* and *HYDROCOTYLE,* which see.

PENTSTEMONS[1] (Nat.Ord. Scrophulariaceæ). — Hardy herbaceous perennials, 2½–4 ft. high, requiring slight protection in the north and colder parts of the country. They succeed in light sandy loam, mixed with leaf-mould and old manure, and are propagated by cuttings and seeds.

---

[1] These are sometimes known by the name of BEARD TONGUE.—EDITOR.

Culture.—Named varieties are increased by cuttings of well-ripened side growths in autumn. These are wintered in a frame or cold house, and planted out in spring. Stronger plants and better blooms are secured by annual propagation. Plants are also easily raised from seed sown in light soil in the spring.

Uses.—Pentstemons hold a foremost place amongst bedding plants and are remarkably handsome used in bold clumps in the herbaceous border. The best results are obtained in light and warm soils, such as well-drained loam or chalky formations. The flowering season is early July till the first frost spoils the blooms.

Varieties.—Barbara Hope, Crimson Gem, Diadem, Harold Carey, King George V., Lady Sybil, Leonard Cutbush, Mrs A. C. Sweet, Newbury Gem, President Carnot, Rajah, Seagull, Southgate Gem, Virgil, and White Newbury Gem.—J. L. G.

[The two species *Pentstemon barbatus* and *P. centranthifolius*, both of which used to be included in the genus *CHELONE*, on which we devote another article, are also worth growing. Their scarlet and orange-scarlet flowers are produced freely from July onwards, and the height varies from a yard upwards.—EDITOR.]

PENZANCE BRIARS.—See under HYBRID SWEET BRIAR ROSES in *ROSE CLASSES.*

PEONY.—See the genus PAEONIA in *SHRUBS.* See also *PAEONY.*

PEPPER CRESS (*Teesdalia nudicaulis*, Syn. *T. Iberis.* Nat. Ord. Cruciferæ).—This is too weedy an annual for general culture, but may be sown in the wild garden, when it will flower in May or June, and grow about 3 ins. high.

PEPPER SAXIFRAGE.—See *SILAUS.*

PEPPER TREE.—The genus CLETHRA, especially *C. alnifolia.* See *SHRUBS.*

PEPPERIDGE (*Nyssa sylvatica*).—See *TREES.*

PEPPERMINT (*Mentha piperita*).—See *MENTHA* and *POTHERBS.*

PERCENTAGES.—See *ARITHMETIC AND GARDENING.*

PERENNIAL CLIMBERS.—See *CLIMBING AND TRAILING PLANTS.*

PERENNIAL FLAX (*Linum perenne*). See *LINUM.*

PERENNIAL HONESTY (*Lunaria rediviva*).—See *HONESTY.*

PERENNIAL, THE USEFUL: Why it should be more grown.—In the course of my wanderings during a recent holiday in North Wales, I was able to visit several interesting gardens, and many more though not actually visited were admired very much in passing. But although one of the big gardens over which I was taken by the head gardener had extensive perennial borders, the leading feature of most of the other gardens I visited was annuals. Annuals were in the beds and borders, in the window-boxes, and in tubs; they reigned entirely on more than one biggish piece of rock garden; in fact, there was so great a use of annuals that one got tired of them.

Of course annuals are many of them very beautiful things, and there is much to say in praise of them, but after all they last only one season, and all the work has to be done again next year if good effects are to be produced. Annuals cannot usually be left to seed themselves, and if they could the seedlings would come up much too thickly, so they must be sown again next April. If the weather is good they come up in shoals, but if not, bare patches result, which later on are rather difficult to fill in. Annuals entail a lot of work, and considering they only last a season, it is to my mind a great mistake to grow them too extensively, for I do not think they are worth it.

The present article is in praise of the perennial. I have seen some really grand masses of colour produced by the use of perennials entirely, so also, I expect, have some of our readers, and I am quite convinced that one good perennial colour border is worth two borders of annuals. A perennial border looks so much more " solid " than one containing annuals only, for the perennial plants, if they are two or three years old, are far bigger and give much more massive effects than it is possible to get with annuals alone. Colour borders on a small scale are, of course, not as possible with perennials as with annuals, for obvious reasons, but where there is space and room it is bad policy to my mind to waste the time by trying to make huge colour borders with annuals. Perennials need ample space for good colour effect, and this space many gardeners will be able to give them.

The obvious reason why perennials should be grown more is that of economy. A perennial border when once planted will last for years, and give most beautiful effects if the plants are thinned and the soil dug up and well manured now and again. Most perennials are strong and stand drought well enough, but this cannot be said of annuals. Perennials, of course, do need staking, and so do annuals, but a good many of them which do not exceed 2–3 ft. in height need not be staked much. This cannot be said of annuals. Nearly all annuals of any height require most careful staking, for annuals are more delicate and " flimsy " subjects than perennials.

It may be said that certain delicate perennials greatly resemble annuals in the above respect, but I reply: " Don't grow delicate perennials unless you have much time and patience to give them." Colour borders containing a lot of delicate perennials are seldom a pleasure to behold.

Annuals are very beautiful indeed, but require a lot of care, and are at the outset hardly worth it where time, labour, and expense are considerations. Annuals should only be grown by those who have plenty of time on their hands or who wish to study and describe these interesting plants. It is the perennial which should be popular, the perennial which should be grown first and the annual second, for it is only with the perennial that colour borders can be planned on a really large scale.—E.

PERENNIAL WALLFLOWER. — See *ERYSIMUM.*

PERENNIALS FOR ALL PURPOSES.

There is practically no limit to the uses of hardy perennials for the beautifying of the garden, the embellishment of the conservatory, or for decorative purposes in a cut state. There are hundreds to choose from, which is confusing to the beginner, hence we give below a few selections.

Perennials for Bogs.—Amateurs often wonder what perennials to plant in very moist soils or by the water-side. We recommend the following: Acanthus in variety; Acorus in variety; Artemisia in variety; *Arundo Donax;* Asphodels in variety; Astilbes in variety; Bamboos in variety; *Caltha leptosepala,* and *C. palustris fl. pl.*, *Cardamine pratensis fl. pl.; Carex* in variety; Cimicifuga in variety; *Cortaderia argentea; Crinum longifolium; Cypripedium spectabile; Dactylis glomerata* var. *variegata;*

Dodecatheon in variety; Echinops in variety; Elymus in variety; Epilobium in variety; *Erianthus Ravennae;* Eulalia in variety; Ferns in great variety; Funkias in variety; *Glyceria aquatica* in variety; *Gunnera manicata,* and *G. scabra* (Syn. *G. chilensis*)*; Helonias bullata;* Hemerocallis in variety; Heracleum in variety; *Iris Kaempferi, I. germanica, I. orientalis, I. Pseudacorus,* and *I. sibirica; Juncus effusus aurea striata, J. e. spiralis;* Liatris in variety; Lythrum in variety; Mimulus in variety; Monardas in variety; *Myosotis palustris; Narthecium ossifragum; Parnassia caroliniana,* and *P. palustris; Phalaris elegantissimum; Phragmites communis aureus; Physostegia virginiana* (Syn. *Dracocephalum virginicum*); Polygonum in variety; Primula in great variety; *Ranunculus aconitifolius fl. pl., R. amplexicaulis,* and *R. parnassifolius; Rodgersia Æscutifolia, R. podophylla, R. pinnata,* and *R. alba;* Sarracenia in variety; *Scirpus lacustris;* Solidago in variety; *Spigelia marilandica;* Spiraea in variety; *Stipa Calamagrostis, S. elegantissima,* and *S. pennata;* Tradescantia in variety; and Trollius in variety.

Perennials for Borders.—More perennials are available for this than for almost any other purpose. The most suitable for ordinary soils and situations *over three and a half feet in height* are Acanthus in variety; Aconitum in variety; *Anchusa italica Dropmore* and colour sports *Opal* and *Picotee; Anemone japonica* in variety; Asphodelus in variety; Asters (Michaelmas Daisies), such as *A. cordifolius, A. ericoides, A. Novae Angliae, A. Novi Belgii,* and *A. vimineus,* all in their numerous varieties; *Bocconia cordata* and *B. microcarpa; Calystegia hederacea* and *C. pubescens* (Climbers); *Campanula alliariaefolia, C. celtidifolia, C. lactiflora, C. persicifolia,* and *C. pyramidalis;* Centaurea in variety; *Chrysanthemum maximum* in its lovely varieties, as well as *C. uliginosum; Crambe cordifolia;* Delphinium (Perennial Larkspur) in variety; Doronicum in variety; *Echinops Ritro;* Eremurus in variety; *Galega officinalis; Helenium pumilum magnificum,* and other varieties; *Helianthus laetiflorus, H. multiflorus,* and *H. rigidus,* all in their numerous varieties; Heliopsis in variety; Kniphofia (Tritomas, Torch Lilies) in variety; *Papaver orientale* in variety; *Romneya Coulteri* (Californian Poppy); *Rudbeckia laciniata* in variety; and Verbascum in variety.

Perennials *under three and a half feet* and *over eighteen inches* include amongst others Achillea in variety; *Anchusa Barrelieri* and *A. myosotidiflora;* Aquilegias in variety; *Aster Amellus* in variety, including its garden hybrids; Astilbe in variety; *Centaurea montana* in variety; Centranthus in variety; *Chrysanthemum maximum* in variety; *Dicentra spectabilis; Dictamnus Fraxinella* in variety; *Echinacea purpurea;* Eryngium in variety; Gaillardia in variety; Geraniums in variety; *Geum coccineum* in variety; *Gypsophila* in variety; *Helenium Hoopesii;* Hemerocallis (Day Lilies); *Hesperis matronalis fl. pl.* (double Sweet Rockets); *Incarvillea Delavayi;* Inula in variety; *Iris germanica* in variety, as well as *I. Kaempferi, I. orientalis* and garden hybrids; *Lychnis chalcedonica* in variety; *Malva moschata; Monarda didyma* in variety; *Paeonia chinensis,* European double and single forms; *Pentstemon barbatus* in variety; *Phlox paniculata* in variety; Polygonum in variety; Potentilla in variety; *Scabiosa caucasica* in variety; Spiraea in variety; Thalictrum in variety; Trollius in variety; and Veronica in variety.

Perennials *under eighteen inches* in height include Anemone in variety; *Anthemis cupaniana;* Anthericum in variety; *Aquilegia glandulosa* and *A. Stuartii; Arabis albida* (single, double, and variegated forms); Armeria in variety; *Asclepias tuberosa;* Asperula in variety; *Aster alpinus* in variety, and *A. diplostephioides;* Astrantia in variety; Aubrietia in variety; Campanula (dwarf varieties); *Coreopsis oculata;* Erigeron in variety; *Gentiana acaulis* and *G. verna;* Geum in variety; Gypsophila in variety; Heuchera in variety; *Iberis sempervirens* (Perennial Candytuft); *Iris pumila,* and several other species; Lychnis (many dwarf varieties); Meconopsis in variety; *Nepeta Mussini;* Œnothera in variety; *Papaver nudicaule* (Iceland Poppies) in variety; Pentstemon in variety; Phlox in variety; *Polemonium caeruleum variegatum,* and *P. humile* (Syn. *P. Richardsonii*); *Polygonum affine;* Primula in variety; Ranunculus in variety; Veronica in variety; *Viola cornuta* in variety, and Viola (Tufted Pansies) in variety.

Perennials for Conservatories.—If we include cold greenhouses in this section there are many hardy perennials for this purpose which will give results far out of proportion to labour or cost they incur. Some of the best comprise: *Anchusa italica Dropmore; Anemone japonica* in variety; Antirrhinum in variety; Aquilegia, preferably Veitchii hybrids; Asters, or Michaelmas Daisies (the small-flowering section are particularly effective); Astilbe (Arendsii hybrids for choice); *Campanula persicifolia,* and *C. pyramidalis; Dicentra spectabilis;* Heucheras; *Lavatera Olbia;* Pentstemons, Phloxes, Polyanthus, and Verbascums (especially the large-flowering hybrids).

Perennials for Cutting.—The best hardy perennials for this purpose include *Achillea Ptarmica The Pearl* and *A. decolorans; Asperula hexaphylla; Chrysanthemum maximum* in variety; *Gaillardia grandiflora* in variety; *Gypsophila paniculata,* and its double counterpart; Heucheras in variety; *Lupinus polyphyllus,* and *L. arboreus; Papaver orientale,* and *P. nudicaule* (Oriental and Iceland Poppies); Phloxes, all varieties; Pyrethrums, all varieties, single and double; *Scabiosa caucasica* in variety; and *Thalictrum rugosum.*

For hints on cut flowers see our articles on *FLOWER GATHERING* and *FLOWERS FOR INDOOR DECORATION.*

Perennials for Hot, Dry Soils.—We suggest the following: Achillea in variety; *Alyssum saxatile* in variety; *Antennaria dioica* (Alpine Everlasting); *Arabis albida* (single, double, and variegated forms); Aubrietias in variety; *Armeria latifolia* (lilac, white, and pink); Cheiranthus in variety; Cistus in variety; Dianthus in great variety; Dracocephalum in variety; *Erodium chrysanthum, E. guttatum, E. hymenodes,* and others; Eryngium in variety; Geranium in variety; Gypsophila in variety; Helianthemum in variety; Hypericum (single and double sorts); Iberis (Perennial Candytuft) in variety; Linaria in variety; Linum in variety; *Lupinus polyphyllus* in variety, and *L. nootkatensis; Nepeta Mussini; Plumbago Larpentae; Polygonum vaccinifolium;* Sedum, all varieties; Sempervivums, all varieties; *Saponaria ocymoides;* Thymus in variety; and *Verbascum phoeniceum* in variety.

Perennials for Rock Gardens.—There are hosts of these, but some of the best include: Æthionema in variety; Alyssum in variety;

Anemone in variety; Antirrhinums in variety; *Aquilegia alpina;* Arabis in variety; Arenaria in variety; *Aster alpinus;* Astragalus in variety; *Callirhoë involucrata;* Campanula in variety; *Cerastium Biebersteinii,* and *C. tomentosum; Cheiranthus alpinus;* Coronilla in variety; Corydalis in variety; Dianthus in variety; Draba in variety; Erigeron in variety; *Erinus alpinus; Erysimum rupestre;* Geranium in variety; Geum in variety; Globularia in variety; Gypsophila in variety; Helianthemum in variety; Heuchera in variety; *Hutchinsia alpina;* Iberis in variety; *Leontopodium alpinum* (Edelweiss); Linaria in variety; Linum in variety; *Lippia repens; Lotus Siliquosus;* Lychnis in variety: Meconopsis in variety; *Michauxia campanuloides;* Mimulus in variety; Myosotis in variety; Œnothera in variety; Ononis in variety; *Papaver alpinum* and *P. nudicaule* with their varieties; *Phuopsis stylosa; Phyteuma orbiculare;* Platycodon in variety; *Polemonium confertum* and *P. reptans;* Potentilla in variety; Primula in variety; *Saponaria ocymoides:* Saxifraga in variety; *Scutellaria alpina;* Silene in variety; Statice in variety; Tiarella in variety; *Tunica Saxifraga; Verbena Chamaedryoides;* Viola in variety; and *Vittadenia triloba.*

Perennials for Old Walls.—A few of the best include: *Achillea tomentosa: Alyssum saxatile;* Antirrhinum in variety; Arabis in variety; Arenaria in variety; Campanula in variety; Centranthus in variety; Cheiranthus in variety; *Coronilla minima; Corydalis lutea;* Dianthus in variety; *Draba aizoides; Erinus alpinus;* Erodium in variety; Gypsophila in variety; Helianthemum in variety; *Hutchinsia petraea;* Iberis in variety; *Linaria Cymbalaria;* Lychnis in variety; *Santolina lanata; Saponaria ocymoides;* Saxifragas in variety; Sedums in variety; Silene in variety; Thymus in variety; *Tunica Saxifraga fl. pl.;* and Veronica in variety. See also articles on *North Borders* and *Shady Borders.*

Perennials for Town Gardens.—The following are a few of the many suitable subjects: Aconitums, Agapanthus, Anemones, Asters, Aubrietias, Auriculas, Campanulas, Chrysanthemums, Delphiniums, Dianthus, Ericas, Gaillardias, Geums, Heleniums, Helianthus, Hemerocallis, Hollyhocks, Hypericums, Iris (particularly the "Flag" section), Kniphofias or Tritomas, *Lathyrus grandiflorus,* Linarias, Linums, Lychnis, *Lupinus polyphyllus* and *L. arboreus,* Montbretias, Pansies, Papavers (Oriental and Iceland Poppies), Pentstemons, Phloxes, Physostegias, Polygonums, Primulas, Pyrethrums, Rudbeckias, Solidagos, Statice, Tradescantias, Verbascums, Veronicas, and Violas.

Perennials for Under Trees.—A large number are available, of which the following are some of the best: Ajuga in variety; Anemone in variety; Astrantia in variety; *Cardamine pratensis fl. pl.;* Corydalis in variety; Cyclamen in variety; Cypripedium in variety; Dodecatheon in variety; Epimedium in variety; Euphorbia in variety; Ferns in great variety; Funkia in variety; Gaultheria in variety; Helleborus in variety; Hepatica in variety; *Horminum pyrenaicum; Lysimachia Nummularia; Meconopsis cambrica; Mertensia sibirica; Polygonum affine; Saxifraga cordifolia, S. umbrosa; Sedum spurium;* Thalictrum in variety; *Tiarella cordifolia, T. unifoliata; Trillium grandiflorum;* Vinca in variety; and *Waldsteinia trifolia.*

Jno. Ha.

PERENNIALS FOR BOGS;
FOR BORDERS;
FOR CONSERVATORIES;
FOR CUTTING;
FOR HOT, DRY SOILS;
FOR OLD WALLS;
FOR TOWN GARDENS;
FOR UNDER TREES.—See *PERENNIALS FOR ALL PURPOSES.*

PERENNIALS : GENERAL CULTURE OF.

Hardy Perennials and indeed Half-Hardy Perennials are of such immense importance nowadays that an article on the general culture of them is called for in this Dictionary. It is not sufficient now for the gardener to get roots of various Perennials to plant in his borders in the spring or autumn when he wishes to increase his collection. It is not enough either for him to beg divisions or slips from his friends. He must be acquainted with the methods of growing them for himself, from the earliest stages to the time when they come to their best, namely, at the end of a period of three years.

It is very interesting work, the raising of Hardy Perennials from seed. To think that the tiny seeds which many of them possess, are capable of growing into enormous plants 6–8 ft. high, covered with bloom of some of the most entrancing colours, makes one wonder at the power of Nature, who can do what seems impossible at the start. The tiny seeds first grow into seedlings, which the gardener must take care of, then into first-year plants, which endeavour to flower, but this must be stopped; then into second-year plants, which may be allowed to produce one or two spikes of bloom — these should be cut off immediately for use in the home; and last of all into three-year plants, from which masses of bloom can be cut week by week throughout the flowering period.

HARDY PERENNIALS.—First of all, then, let us speak about the culture of Hardy Perennials and give attention towards the end of our article to the culture of the less hardy species. There is nothing to fear as regards the difficulty of growing Hardy Perennials. Most of them are of extremely easy cultivation, though naturally in the seed stages they require care. Damp is the great enemy of the seedlings, but precautions must be taken against it. Slugs and snails are among the chief enemies, but these can be got rid of by using a soil fumigant or one of the patent slug and snail traps.

Sowing the Seed.—Seed of Hardy Perennials is best sown either out of doors in a lightly shaded spot, or in a cold frame from June 1st to June 15th. The soil should be so light that at least one-quarter of its volume is sand, since, if it is too rich, the seedlings will not be of the short, sturdy nature which every gardener requires. If the rich soil be used, they will be tall, soft, and sappy. They will look well, it is true, but they will not do well.

Very shallow drills are taken out with a pointed stick, and these drills should be at least 6 ins. apart. For small seeds the depth should not be more than one-third of an inch, but larger seeds may be buried 1 in. or slightly more. Should the soil be dry at the time, the seed-bed should be thoroughly well soaked with warm water the night before. It will then be in an almost ideal state for sowing the following morning.

As is the case with all seeds, strong plants cannot be expected if thick sowing is adopted. Thick sowing means small, spindly seedlings of a stunted appearance, which will do no good at all, and these might as well be scrapped at once. Thin sowing produces strong, short sturdy, many-branched seedlings, which are a pleasure to look at, and which are all that can be desired. So bear in mind when you are setting the seed of Hardy Perennials to sow it extremely thinly, and if you cannot trust yourself to do this direct from the packet, mix the seed with ten or even twenty times its volume of fine sand, and sow the mixture very thinly along the drill.

It is obviously a necessity that each drill should be devoted to a separate class of plant. At the end of each drill should be put a painted label with the name of the plant and the date on which the seed was sown. This serves as a guide for the gardener, and at any rate he knows what his plants are when they appear. It does not do to trust to memory, since memory frequently fails on just the very matters which one wants to retain in one's mind.

Having sown the seed, if it is very small, cover it lightly with soil that has been passed through a very fine riddle, otherwise the soil from the drill may be drawn back, and the seed covered with this. Give a slight watering through a fine-rosed can, put on the lights if a frame is used, and leave Nature to do the rest.

As soon as the seedlings appear it is essential that air should be given. Should the weather be unduly hot, it is advisable either to paint the glass of the frame over with some kind of lime-wash, or to shade it with tiffany mats during the hottest part of the day. The latter is preferable since it can be removed or put on at will. If the plants are sown out of doors, it may be necessary to stretch black cotton over them to prevent the birds from pecking the seeds or seedlings as they appear. Some kind of shade will again be necessary if the seed-bed is unfortunately placed in the hottest part of the garden.

Pricking Out.—When the plants are about a couple of inches high, which should be within thirty days of sowing in most cases, it is essential that the bed for pricking them out shall be prepared without delay. Instead of putting this in a shady part of the garden, the writer favours its preparation in the sunniest possible spot, since strong growth is advisable at this stage, and not lanky growth, which is produced by seedlings being drawn in a shady spot in their effort to reach the sunlight. The site intended should be thoroughly well dug, and some old hotbed manure or, better still, cow manure, which is at least two years old, should be dug in, not more than 9 ins. deep. If some burnt wood ashes from the garden fire can be spared, dig these in, at the rate of two ounces or more per sq. yard, and a dressing of old soot sufficient to blacken the surface of the soil very thoroughly will, if forked in, do much to keep down harmful pests which may otherwise prove troublesome. Should soot not be available, a mixture of one part Naphthaline to fifteen parts of Quicklime may be forked in fairly generously, so long as the bed is prepared ten days prior to pricking off.

The actual work of pricking off must be done with some care. The seedlings are lifted from the seed-bed, or seed-drills, as we had better call them, with a small hand-fork. Each plant is separated without breaking its roots, and the pricking off, instead of being done with a dibber, which instrument necessitates the roots of the plants being doubled up in a hole very much too small for them, instead, I say, of doing anything so foolish as that, the little plants should be set singly with a trowel, in holes large enough for them, and in such a way that their roots just touch the bottom of these holes. They should be made very firm. Should the plants be exceptionally strong it will be advisable to set them about 9–10 ins. apart each way, putting the plants alternately in the rows, so that any given plant is opposite to the space between two others in the row above or below. If the plants are not exceptionally strong, 6–7 ins. apart each way will be more than sufficient, but again, if the gardener's hoe has a blade 5 ins. wide, a distance of 6 ins. between the rows will not be sufficient to allow for the use of the tool.

Should the pricking out have to take place in exceptionally dry weather extra precautions must be taken. The plants should have a thorough soaking of water the night before, in which one quarter of an ounce of Sulphate of Ammonia or Nitrate of Soda has been dissolved in each gallon. This will serve to encourage them to face the check they are to receive on the day following. The site itself, if the soil be dry, should be thoroughly well soaked with water the night before, and if the Clerk of the Weather wills that a particularly hot July day shall come just when you wish to prick out your plants, it may be advisable to rise from your bed an hour sooner and give the site another soaking of water in the early morning. By the end of the afternoon the bed in which they are to be pricked out should be in a decent condition for the work, but on no account must it be made so wet that it is pasty, for no new roots can grow in mud. Firm planting is absolutely essential, and the soil must thus be in just the right state for the work.

After pricking out, give a thorough good watering, and should there be any fear of pests lurking about, a thorough good dose of old soot will be advisable, while the plants are still wet. The after culture during the first summer consists of frequent hoeing and watering when the soil becomes dry. It is inadvisable to feed them with any liquid manure at this stage, save perhaps an occasional dose of soot water. The writer is quite aware that seedling perennials are usually dosed with all manner of concoctions, patent and otherwise, during the first few months of their growth, but he considers that the freaks which are seen, not to speak of the appalling specimens which are sometimes planted into Herbaceous Borders, are due largely, if not completely, to this very grave error in cultivation.

Care in the Winter.—It now becomes necessary to pay some attention to the important matter of the care of these young plants in the winter. Of course, the first winter is to be feared most, but the second winter is not without its dangers, and it is easy to lose a valuable collection if care is relaxed when the plants are some fifteen or sixteen months old. Winter care is thus almost more important than that lavished on the plants in the summer; but it is well to point out at this juncture that, if bad cultivation is adopted in the summer, the plants are far more likely to die during the winter, however much care is bestowed upon them. But if the plants are strong, sturdy stuff, with short, stumpy growth and plenty of joints, without any of the soft, sappy appearance which is all too common, then they can reasonably be expected to withstand the winter, even if they must remain out of doors.

Should it be your fate to live in a very exposed district where winds blow straight from the fells or the moors, where snow and sleet are of almost daily occurrence during the months of December, January, and February, and where the thermometer frequently registers twenty degrees of frost, then it would be well not to risk leaving the first-year or even second-year plants out of doors during the winter. They might come through perfectly well, but, on the other hand, there is a grave risk of losing the lot, and it is better in this case to arrange a rough frame in a southerly position in the garden. Lift the plants in October and set them fairly close together in light sandy soil or even in ashes, labelling each row carefully to avoid confusion next spring, and then put on the lights and leave them on throughout the winter, except on days when ventilation can safely be done without the thermometer registering anything below 36° F. In this case it is advisable that the position selected be a dry one, where there is plenty of drainage, or damping off is almost certain to take place.

If, on the other hand, you live in a genial spot where you only have to face an average winter, there is no need for anything so obviously tiresome as lifting of the plants either in the first year or in the second season. Instead of lifting them, the dead growth after frost has come should be cut off, and little mounds of ashes put over each crown in such a way that the rain will run off. These little mounds are removed in the month of March, and it will be found that the plants are already beginning to grow at that time, and will come through the winter perfectly safely with that treatment. It is advisable to do this both for the first and the second years in order to ensure thoroughly strong plants for the borders during the third season.

Some writers favour the use of half-rotted leaf-mould or cocoanut fibre refuse for the purpose just mentioned, but anything of a vegetable origin seems to the present writer to be fraught with a certain amount of danger. Although such material as cocoanut fibre may seem very innocent in itself, the fact remains that it is of vegetable origin, and is thus capable of fermenting. Should it start to decompose in contact with the crowns of these plants, in nine cases out of ten it would decompose them also, and when it was raked off in the spring of the year, there would be nothing left but lifeless pieces of rootstock in each case.

Planting Out.—The writer is quite aware that most gardeners would plant perennials out in their permanent positions in the Herbaceous Border some seventeen or eighteen months after the seed was sown, namely, during the second year of their growth. This seems to be quite a mistake on consideration. It never pays, for the plants cannot have the individual attention once they are in the border that they would receive in any less permanent position. So, despite all that may be said in favour of planting out permanently in the spring of the second season, all gardeners are advised to leave the plants where they are until the autumn of the second season or until the spring of the third season. This will ensure their being really strong when they are planted out, and results will be far better than they would otherwise be.

As regards the preparation of the ground for planting out permanently, this is dealt with under *HERBACEOUS BORDERS*. The same remarks apply to after cultivation, such as tying up, hoeing, cutting the flowers, and so on, which are all dealt with in that article, and are referred to in other articles as well, as, for instance, in the article on *STAKES AND STAKING*. Care must be taken even in the third year to protect choice plants from the ravages of pests by dusting with lime or soot, and so on, and the choicer plants, especially if the district is exposed, should be protected by a mound of ashes over their crowns in the way just described.

Culture by Division.—A word must be said in conclusion as to the general culture of perennials by means of division. Now division of the rootstock means more than merely chopping a clump into four pieces with a sharp spade. True, it is the course most usually adopted, and unless care be taken, plants can be utterly spoiled by this rough method of treatment. A carving knife is a far better tool than a spade to use, and the sharper and older it is, the better.

The best time to propagate by division is in the autumn or early spring. The clumps are lifted with as much earth as possible on them, and cut in such a way that the strong outer portions are retained, and the weak or often dead pieces are rejected. The clumps are then re-planted in good soil in the border, and should do very well, even during the first season, after this ordeal.

It is well to note that such plants as Lupines will not propagate easily by this method. Much the same applies to Anchusas, though these are not quite so difficult as Lupines. Where there is difficulty in increasing by division of the roots, it is best to raise stock by seed every third or fourth year and have a batch of plants constantly following on.

There is another mode of culture which is allied to division. This is propagation by means of root cuttings. Early flowering perennials always throw up a lot of young growth within a month after they have finished flowering, and if this is cut off by, or just under, the ground line, it very often has roots already attached to it, so that each shoot is really a little plant.

To propagate by this means is thus easy. A sharp knife is used to sever the shoots from the parent plant, and these are pricked out, or rather planted with a trowel in a bed of light sandy soil in a site not too sunny. The distance apart will, of course, vary with the nature and size of the plant, but at any rate it should not be less than 6–7 ins. each way. Frequent hoeing and frequent watering immediately after, and during the three months following the ordeal, are the secrets of success.

As regards stimulating these young plants, far the safest liquid to use is soot water. They can have constant soakings of this liquid, and will be mildly stimulated as well as protected from the ravages of a great number of pests. Plants increased by this method may be set in their flowering positions the same autumn or the following spring, but they must not be allowed to do much during the first season.

Throughout the whole general culture of Hardy Perennials it is immensely important to keep the beds thoroughly hoed and weeded. The very act of hoeing stimulates the growth and kills enormous numbers of weeds as well as surface pests, and if gardeners realised the vast importance of this work, there would be more success in Perennial Cultivation than there is at present.

HALF-HARDY PERENNIALS.—Now that we have dealt more or less fully with the culture of Hardy Perennials, we must conclude with a few remarks on the culture of the less hardy species, known collectively under the term Half-Hardy Perennials. There are various ways of growing these plants, and one of the most favourite is to adopt a system similar to the culture of Half-Hardy Annuals. To do this, seed is purchased early in the year, and is sown very thinly in boxes of light sandy soil in heat, in January or early February. The boxes are covered with glass, and brown paper is put over the glass to exclude light. As soon as the seedlings appear, the glass and paper are removed, and they are put close to the light on a shelf high up in the greenhouse. This will encourage short, sturdy growth, which is so eminently desirable.

When the little plants are a few inches high, they should be pricked off into other boxes of similar light soil, and brought on with all possible speed, being put close to the glass in the greenhouse. In April and May they are transferred to a cold frame to be hardened off, and by the end of May they should be in a fit state to plant out. Planting out can be done in Herbaceous Borders or in separate beds similar to bedding plants, and care should be taken in each case to plant very firmly. The rest of the culture through the summer is very similar to that of Hardy Perennials, so we pass on to the first winter.

Now Half-Hardy Perennials will not stand out of doors through the winter, so it becomes necessary to lift them about the end of September and plant them close together in boxes of light soil, transferring these to the greenhouse, where a temperature of not less than 45° F. can be maintained. The structure should be ventilated on all possible occasions to ensure the prevention of damp, but the temperature should not be raised unduly, as this is the resting season of the plants. Next spring in May they can be planted out again in their permanent positions and once more lifted the following October. Usually Half-Hardy Perennials do not stand more than the third or fourth season, so it is advisable to have a new stock coming on.

Half-Hardy Perennials may also be sown out of doors in May or June when Hardy Perennials are sown. In this case the culture of the two classes is the same until the autumn of the first season, after which the seedlings of the Half-Hardy sorts must be transferred to a greenhouse. The cold frame is not sufficient protection.

It must be remembered that there are a very large number of plants which are included in the term Half-Hardy Perennials. The great majority of greenhouse plants are Half-Hardy Perennials, but they do not come quite within the scope of this term. When we talk about Hardy Perennials, we mean Hardy Herbaceous Perennials, plants which can be grown out of doors in the borders and die down every autumn. Also, when we speak of Half-Hardy Perennials, we mean Half-Hardy Herbaceous Perennials, plants which are useful for the outdoor garden though they need winter protection. These also die down naturally every autumn, and come up again the following spring. Thus most of the greenhouse plants are ruled out of this category, as the majority of them will continue growing right through the winter months without ceasing, and have not a herbaceous rootstock in the sense of true Half-Hardy or Hardy Perennials.

It must be remembered that, when

there are so many really first-class Hardy Perennials, it is to a certain extent waste of time to grow any large quantity of plants which need greenhouse protection during the winter, and can only be put out in the borders in the summer. Thus Half-Hardy Perennials have not, and never will, it is thought, come to the front as have their hardier brothers of late years, and gardeners must have much leisure and much glass at their disposal if they are to make a success of the cultivation of these somewhat *difficile* plants.—E. T. E.

PERENNIALS, HALF-HARDY : List of.—For the convenience of those interested we think it desirable to give a short list of good Half-Hardy Perennials, including some bulbs and plants of similar nature. The latter are marked *B.* These should be kept dry in winter, and either started under glass or planted out in April or May, except some marked *E.*, which should be put into the ground in March. The others can be wintered in a house where they are kept free from frost, and planted out in May with bedding plants. For cultural details see separate articles on the different sorts.

	Inches
Alstroemeria pelegrina (*B.E.*). White, yellow, and purple. Autumn.	24
Anemotheca cruenta (*B.E.*). Red. Summer.	6
Antholyza aethiopica (*B.E.*). Red and yellow. Autumn.	24
Antirrhinum Asarina. Yellow. Summer.	6
Aster capensis (Syn. *Agathaea amelloides*). Blue. Summer.	12
Babiana in variety (*B.E.*). Various. Summer.	9
Begonia (*B.*). Various. Summer.	6–12
Calceolaria. Various. Summer and autumn.	6–9
Campanula Vidalii. White. Summer.	12
Canna hybrida. Various. Autumn.	12–24
Celsia Arcturus. Yellow. Summer.	18
Centaurea ragusina (Syn. *C. candidissima*). Yellow, white foliage. Summer.	18
C. rutifolia (Syn. *C. Cineraria*). Yellow. Summer.	12
Convolvulus aureus superbus. Yellow. Summer.	Climber
Cosmos diversifolius atrosanguineus. Black-purple. Summer.	36
Dahlia in variety (*B.*).	36–72
Francoa glabrata. White. Summer.	24
F. ramosa. White. Summer.	18
F. rupestris. Pink. Summer.	18
Gazania hybrida. Various. Orange, yellow, white, etc. Summer.	18
Gerbera Jamesonii. Orange-scarlet. Summer.	18
G. Jamesonii hybrida. Various. Summer.	18
Gladiolus. See separate article.	
Heliotropium in variety. Summer.	12–24
Impatiens Holstii hybrida. Vermilion, etc. Summer.	18
Incarvillea Olgae. Rose-pink. Summer.	36
I. variabilis. Rose-pink. Summer.	12
Lantana hybrida. Various. Summer.	12
Leptosyne maritima. Yellow. Summer.	36
Linaria triornithophora. Purple and yellow.	24
Lobelia Erinus, etc. Various. Summer.	6–12
Mandevillea suaveolens. White. Summer.	Climber
Maurandya barclayana. Purple. Summer.	Climber
Melianthus major. Purplish. Summer.	36
Mirabilis Jalapa (*B.*). Various. Summer.	24
Nicotiana tomentosa (Syn. *N. colossea*). White. Summer.	72
Nierembergia filicaulis. Lilac. Summer.	12
N. frutescens. Blue and white. Summer.	18
Pancratium maritimum (*B.E.*). White. July.	18
Pentstemon Bridgesii. Red-purple. Summer.	9
Rehmannia angulata. Rose. Summer.	24
R. a. Pink Perfection. Pink. Summer.	24

	Inches
Rhodochiton volubile. Purple. Summer.	Climber
Salvia patens. Blue. Summer.	24
S. splendens. Various. Summer.	24
Tigridia pavonia (*B.*). Various. Summer.	9
Verbena hybrida. Various. Summer.	12
Wigandia imperialis. Showy foliage. Summer.	12
Zephyranthes carinata (*B.*). Rose. Summer.	9
Z. rosea (*B.*). Pink. Autumn.	12

S. A.

PERENNIALS, PLANTING. — See *PLANTING.*

PERESKIA.—A genus of cactaceous plants. See *CACTI.*

PERFUME MAKING.

The extraction of perfume from flowers is an interesting operation. By following the simple plan below, a highly scented oil may be secured that will retain its fragrance for an indefinite period.

Take a good-sized jar and cut a number of rounds of cotton-wool, such as will fit inside the vessel. Then secure a quantity of the finest olive oil, and immerse the pieces of cotton-wool in this until thoroughly saturated. The flowers from which it is desired to extract the perfume should be freshly gathered. By far the best time to pick them is in the early hours of the morning directly after the dew has disappeared. All the green parts of the flowers should be removed, and the larger blossoms, such as roses, picked to pieces. When the flowers have been prepared they may be packed away in the jar, placing one of the oil-soaked rounds of cotton-wool in the bottom first and then scattering on to this, a handful of the petals, at the same time adding a light sprinkling of finely crushed common salt. Then put another of the pieces of cotton-wool on the top, and add another layer of petals with more salt. Proceed in this way until the jar is full. To get a large number of petals into the jars the mass may be pressed down from time to time. Last of all tie a piece of paper over the mouth of the jar and stand it outside in the sun.

At the end of two days the oil will have absorbed most of the perfume of the flowers, and to get as much as possible of it from the cotton-wool, the best plan is to tip the whole of the contents of the jar into a piece of fine muslin. Tie the corners of the material together so that a bag is formed. Get a clean bowl and, into this, press out all the oil that can be squeezed, storing this in tightly stoppered bottles. Some wonderful natural perfumes may be prepared from real flowers in this manner, and not a few will prefer these to the more complicated scents of the manufacturer.

Another interesting way of capturing the fragrance of flowers involves the use of ice. Procure a small glass funnel such as is often used by chemists. The narrow end instead of being open, should be drawn out to a fine point. This may be done by softening the end of the funnel in a gas flame and then closing and shaping the glass into a point. For supporting the funnel a retort stand is useful but, if this cannot be secured, a length of thick wire can be made to serve. Bend the end of this round in a circle in which the funnel will rest. The other end of the wire may be held firmly between two heavy books or boxes. In any case the funnel should be raised sufficiently high to place a glass vessel underneath.

The flowers must be fresh and it is well to carry out the operation in a warm room where the perfume will be freely emitted. In order to prevent the blossoms from fading, place them with their stalks in water. Stand the vase close to the glass funnel and then fill the latter with small fragments of ice. After an interval it will be seen that the moisture from the air is condensing on the outside of the glass funnel and, as this accumulates, it trickles down into the glass vessel below. After the ice in the funnel has melted a further supply may be filled in. When a fair amount of the condensed moisture has been collected this may be examined. It will be found to be deliciously perfumed according to the kind of flower from which the scent has been captured. The fragrant volatile oil of the blossoms has blended with the moisture of the atmosphere which has been condensing on the outside of the funnel. Flower perfume captured in this manner will not keep good indefinitely unless it is blended with an equal quantity of spirits of wine. In this state it may be bottled up for use as required.

S. L. B.

PERILLA.—See *ANNUALS, HALF-HARDY : LIST OF.*

PERIPLOCA.—For the best species see *CLIMBING AND TRAILING PLANTS.*

PERISTERIA.—See *ORCHIDS*

PERIWINKLE (*Vinca.* Nat. Ord. Apocynaceæ).—Considerable discussion took place a year or two ago as to whether this plant was suitable or not for rock garden culture. We held, and still hold, that it is ; others say emphatically no, so readers must form their own opinion. That it spreads very rapidly most gardeners know, but in rock borders and large sweeps of the rock garden this is no disadvantage. If it be used as a carpeting plant in the rock border, rock garden, herbaceous border, or wild garden, it should certainly be kept away from choicer subjects, since it will quickly smother any plants which are somewhat weak. It is excellent for carpeting ground under deciduous trees.

Culture. — Botanically, Periwinkles are hardy and stove evergreens, but the hardy sorts are admissible in the herbaceous border, as they respond to the usual culture for hardy perennials. With the stove species we do not deal in the present work in accordance with our note on *STOVE PLANTS* elsewhere. All the species described below may be propagated by seeds in the summer, division of the roots in November or March, and by cuttings inserted in a shady spot in the spring, while they may be successfully planted any time during the winter.

Border and Rock Garden Species.—We describe a few of the best, most of which grow with remarkable freedom and even thrive under the shade of trees :—

Vinca herbacea (Syn. *V. acutiflora*).—This is a useful sort, bearing purple flowers in June and July It grows about 1½ ft. high.

V. humilis.—Syn. *V. minor,* which see.

V. major.—This bears blue or purple flowers in July and August, averaging about 2 ft. in height. The variegated variety is pretty also.

V. media.—This is a pretty blue sort, flowering in July and August, and growing about 12 ins. high.

V. minor (Syn. *V. humilis*).—This is quite the most popular but spreading Periwinkle of all. It bears flowers of various shades of purple, lilac, blue, and also white, from June to October, and averages about 6 ins. high. There are varieties of each colour with variegated foliage.

See also *WATER GARDEN : PLANTS FOR THE,* and under VINCA in *SHRUBS.*

PERMANENT HARDNESS. — See *WATER : TO SOFTEN.*

PERMANENT PEACH TREES.—See *PEACHES.*

PERMANENT VINES.—See *VINES.*

PERMANGANATE OF POTASH.—See POTASSIUM PERMANGANATE in *POTASH AND POTASSIUM COMPOUNDS.*

PERMEABLE AND IMPERMEABLE BEDS.—See *GARDEN GEOLOGY.*

PERNETIANA ROSES. — See *ROSE CLASSES.*

PERNETTYA.—For the best species see *SHRUBS.*

PERPETUAL BORDER CARNATION. See *CARNATION : PERPETUAL BORDER.*

PERPETUAL FLOWERING CARNATION.—See *CARNATION : THE PERPETUAL FLOWERING.*

PERPETUAL FLOWERING MALMAISONS.—See *CARNATION : THE MALMAISON.*

PERPETUAL SPINACH, or SPINACH BEET (*Beta maritima.* Nat. Ord. Chenopodiaceæ).—As the name suggests, this is not a true spinach, but the leaves when boiled make a very good substitute. Seed may be sown on any well-dug soil from early April until the end of August. The plants need about 9–12 ins. each way. Surplus plants bear transplanting better than most things.

If carefully managed, a bed will remain in a profitable condition for twelve months, and give an enormous crop of leaves.—F. R. .C

PERRY'S WEEPING HOLLY (*Ilex Aquifolium argentea pendula*).—See *HOLLY*.

PERSIAN ANDROSACE (*Androsace filiformis*).—See *ANDROSACE*.

PERSIAN LILAC (*Syringa persica*).—See *SHRUBS*.

PERSIAN RANUNCULUS.—See under TYPES AND VARIETIES in *RANUNCULUS*.

PERSICARIA. — An annual weed. See *WEEDS*. The genus PERSICARIA is now included in *POLYGONUM* at Kew.

PERSIMMON (*Diospyros virginiana*). See *TREES*.

PERUVIAN GUANO.—See *GUANO*.

PERUVIAN LILY. — See *ALSTROEMERIA*.

PERUVIAN SQUILL (*Scilla peruviana*). See *SCILLA*.

PESTS. — See *GARDEN ENEMIES* and *INSECT PESTS*.

PESTS AND DISEASES OF VEGETABLES.—See *VEGETABLES: GENERAL CONSIDERATIONS*.

PESTS, NOTIFIABLE.—See *NOTIFIABLE DISEASES AND PESTS*.

PESTS OF CACTI.—See *CACTI*.

PESTS OF CITY GARDENS.—See *TOWN AND CITY GARDENING*.

PESTS OF FRUIT.—See *INSECT PESTS* and *ORCHARDS: MAKING AND MANAGEMENT OF*.

PETALOSTEMON (Nat. Ord. Leguminosæ).—Two species of this (*P. candidus* and *P. violaceus*), both known by the name of PRAIRIE CLOVER, are worthy of introduction into large herbaceous borders as both are hardy perennials of very easy culture. The first bears white flowers, the second purple or violet-purple. Both bloom from July to August, and average 12 ins. in height.

PETASITES (BUTTER BURR. Nat. Ord. Compositæ).—This is a small but useful genus of hardy perennial plants for the border, rock garden, and wild garden. They thrive with very little care and may be treated in the same way as other hardy border subjects. Propagation by seeds in the summer, and root division in November or February, is a comparatively easy matter, and successful results may be attained by March planting. A selection of the species are briefly described below :—

Petasites albus.—This is a white spring blooming plant growing about 12 ins. high.

P. fragrans.—This is the well-known and popular WINTER HELIOTROPE bearing its white fragrant flowers from November to January. It is useful for the rock garden as it only grows about 9 ins. high, but it spreads rather freely.

P. niveus.—This is a pure white sort blooming in March and April, and growing 12–15 ins. high.

P. officinalis (Syn. *P. vulgaris*).—This, the COMMON BUTTER BURR, sometimes offered as "a desirable pink March blooming subject about 12 ins. high," is really a weed and not worth cultivating.

P. spurius (Syn. *P. tomentosus*).—This is a white April blooming sort about 12 ins. high.

P. vulgaris.—See remarks on *P. officinalis* above, with which this is now considered synonymous.

PETROCALLIS.—Now included in the genus *DRABA*.

PETROCOPTIS.—Now included in the genus *LYCHNIS*.

PETROSELINUM.—Now included in the genus *CARUM*.

PE-TSAI.—A variety of *CHINESE CABBAGE*, which see.

PETTY GRASS (*Chenopodium Quinoa*). See *CHENOPODIUM*.

PETTY SPURGE (*Euphorbia peplus*).—A weed. See *EUPHORBIA* and *WEEDS*.

PETTY WHIN (*Genista anglica*).—See *SHRUBS*.

PETUNIA (Nat. Ord. Solanaceæ). A half-hardy herbaceous perennial, 1–2 ft. high, succeeding in light loam and leaf-mould—not too rich. Propagate by seed sown in heat in March. Named varieties can only be increased by cuttings in the autumn in a warm greenhouse.

Culture.—Prick out early, and pot off the seedlings singly, or, if for bedding, prick out into boxes, harden off, and plant out in May. If for greenhouse culture, grow the young plants steadily on and transfer to their flowering-pots in May.

USES.—Petunias are useful for bedding in hot, dry positions where few other plants would flourish. They are also well adapted for furnishing hanging-baskets, and grow to perfection as pot plants in conservatory or greenhouse. They bloom practically all the summer.

Varieties.—Named sorts are not so much in vogue as they used to be, but choice strains of seed are sold by specialists. The following may be particularly noted: Brown's Purple Strain, Carter's Empress, Carter's New Marbled Purple King, also species such as concordia and hybrids, grandiflora and variegata.—J. L. G.

NEW VARIETY.

Petunia Purple King.—This bears deep violet-purple double flowers.

PEUCEDANUM (HOG'S FENNEL. Nat. Ord. Umbelliferæ).—This is a large but unimportant genus of hardy biennial or herbaceous perennial plants of no value for border culture. The two best known species are *P. graveolens*, the common herb DILL, used for medicinal purposes (see article on *MEDICINAL HERBS*), and *P. sativum*, the WILD PARSNIP, from which the garden parsnip has been obtained (see article on *PARSNIP*). Other species, such as *P. officinale*, the SULPHUR-WORT, and *P. Ostruthium*, the MASTER-WORT, are alike weedy and useless.

PHACA.—Now included in the genus *ASTRAGALUS*.

PHACELIA (Syns. *Eutoca* and *Whitlavia*. Nat. Ord. Hydrophyllaceæ).—The Phacelias form an interesting group of hardy annuals of lowly growth, and probably a dozen species are in cultivation, but only two or three are at all popular. Seeds should be sown in April and the plants thinned to about 6 ins. apart to obtain the best results. They are most suitable for edging or massing, but should not be handled too freely, as some, notably *P. viscida*, will cause severe irritation on sensitive skins.

Phacelia campanularia. — This bears deep blue bell-shaped flowers throughout the summer. Its variety *caesia* has rosy flowers. Both grow about 8 ins. high.

P. viscida (Syn. *Eutoca viscida*).—This attractive sort bears violet and blue flowers from the early summer to the autumn. Its height is 6–12 ins.

P. Whitlavia (Syn. *Whitlavia grandiflora*). — This bears violet flowers very freely throughout the summer, and grows 1 ft. high.

PHAEOPAPPUS.—Now included in the genus *CENTAUREA*.

PHAIOCALANTHE.—See *ORCHIDS*.

PHAIUS.—See *ORCHIDS*.

PHALÆNOPSIS.—See *ORCHIDS*.

PHALANGIUM.—Now included in the genus ANTHERICIUM.

PHALARIS (Canary Reed. Nat. Ord. Gramineæ).—This is a genus of hardy grasses of little garden value though of very easy culture. *P. canariensis* (CANARY GRASS) is interesting and useful as its seeds are food for canaries and other cage birds. Some people confuse this plant with CANARY CREEPER (*Tropaeolum aduncum*). They are, however, quite different subjects.

PHARBITIS.—Now included in the genus *IPOMOEA*.

PHASEOLUS (Nat. Ord. Leguminosæ).—This is a large genus of hardy and tender climbing or twining annuals. The two most important species in this country are *P. multiflorus*, the SCARLET RUNNER BEAN, and *P. vulgaris*, the HARICOT BEAN. See article on *BEANS*.

PHEASANT'S EYE (*Adonis autumnalis*).—See *ADONIS*.

PHEASANT'S-EYE NARCISSUS (*Narcissus Poeticus*).—See *NARCISSUS SPECIES*.

PHEGOPTERIS.—Now included in the genus POLYPODIUM, for which see *FERNS AND FERN GARDENING*.

PHELLANDRIUM.—Now included in the genus *ŒNANTHE*.

PHENOL.—A popular name for CARBOLIC ACID, which see in *ACIDS: THEIR USES IN HORTICULTURE*.

PHILADELPHUS.—For the best species see *SHRUBS*. See also *CLIMBING AND TRAILING PLANTS*.

PHILAENUS.—See CUCKOO SPIT in *INSECT PESTS*.

PHILLYRAEA.—For the best species see *SHRUBS*.

PHLEBODIUM.—Now included in the genus POLYPODIUM, for which see *FERNS AND FERN GARDENING*.

PHLEUM (CAT'S-TAIL GRASS. Nat. Ord. Gramineæ).—This is a genus of hardy easily grown grasses of no great garden value. *P. alpinum*, *P. Michelii*, and some others may be used in the wild garden, and grow about 1 ft. high. *P. pratense*, known as TIMOTHY, and its variety *nodosum* are useful farm grasses on heavy land.

PHLOMIS (Nat. Ord. Labiatæ). This is a genus of hardy shrubs, and half-hardy as well as hardy perennials. We exclude the first two sections as they are not of much importance to gardeners.

Perennial Border Species.—These require nothing more than the usual treatment bestowed on hardy perennials. They succeed in any good rich soil in a sunny site, and are best propagated in the usual way by summer sown seeds or by autumn root division. We recommend the following:—

Phlomis armeniaca.—This bears pure yellow flowers in July, and grows about 1 ft. high.

P. bracteosa (Syn. *P. lamiifolia*).—This bears purple flowers from May to June, and averages 1–2 ft. in height.

P. cashmiriana.—This bears charming lilac flowers from July onwards, and grows about 2 ft. in height.

P. fruticosa[1] (JERUSALEM SAGE).—This is quite the best known and most popular species of all. It bears yellow flowers from June onwards, and grows about 1 yd. in height.

P. lamiifolia.—Syn. *P. bracteosa* above.

P. lunarifolia.—This is a useful yellow sort blooming from June onwards, and averaging 1 yd. in height. Its variety *russelliana* is now considered synonymous with *P. viscosa* overleaf.

---

[1] *Phlomis fruticosa* is classed by Paxton and other authorities as a hardy evergreen shrub, but it nevertheless finds a place in the *Kew Hand-list of Herbaceous Plants*. The same remark applies to *P. viscosa*.—EDITOR.

P. russelliana.—Syn. *P. viscosa* below.

P. samia.—This bears pure purple flowers in June, and averages 2½–3 ft. in height.

P. viscosa (Syns. *P. lunarifolia russelliana* and *P. russelliana*).—This bears yellow flowers from June onwards, and averages 2–4 ft. in height.

PHLOX (Nat. Ord. Polemoniaceae).

Half-hardy annuals (9 ins. high) and hardy perennials 2–4 ft. high.

The subulata section is trailing. They succeed in ordinary enriched garden soil, but *Phlox subulata* prefers a light medium with some peat.

Culture.—The annuals are propagated by seed sown in February or March in slight heat, or in April or May in the open. The perennials by seed sown in similar fashion; by cuttings of young shoots in spring; or by root division during the dormant season. The subulata or spring flowering Phlox can be increased by cuttings in summer, which will root best in sandy soil under glass.

USES.—*Phlox decussata* is the perennial variety which has become so marked a feature of our herbaceous borders. It thrives best in a rich loamy soil in partial shade, but will do equally well in full sun if abundant moisture during summer is provided. For giving a brilliant display in the garden during July and August, few flowers can compare with this subject. Equally beautiful are the spring flowering species in April and May. These are seen to best advantage on the rockery and trailing over a low wall. The Annual Phloxes are effective in small beds, and in rockwork are wonderfully floriferous, and bloom over a long period.

VARIETIES.

Annual Section.—Selected strains of Drummondii and Hortensiæflora.

Decussata Section.—Elizabeth Campbell, Derviche, Fort de France, Frau A. Buchner, General Van Heutsz, Gipsy Queen (Gruppenkönigen), Hans Volmoller, Le Mahdi, Rijnstroom, Mrs H. F. Bowles, Selma, and Sergent Lovy.

Subulata Section.—Brightness, Dairy Hill, Fairy, G. F. Wilson, Little Dot, Nelsoni, Newry Seedling, The Bride, Vivid.

J. L. G.

PHLOX: Rock Garden Species.

About half a dozen species are suitable for the rock garden. These thrive in open situations if a sandy loam is provided. They are propagated by division of the roots in autumn or spring, by cuttings in July, and by seeds sown in March and April.

Phlox amoena.—A dwarf spreading plant. Flowers are a rose colour. Site open. Soil sandy loam. Flowering Period, May. Height, 4 ins.

P. divaricata.—An erect tufted plant. Flowers lavender blue. Site, half-shade. Soil rich sandy. Flowering Period, May to June. Height, 1 ft. Its variety *alba* is white.

P. ovata.—An evergreen spreading species. Flowers rosy-pink. Site, half-shade. Soil rich loam. Flowering Period, May to August. Height, 1 ft.

P. reptans.—A creeping plant. Flowers are a rose colour. Site open. Soil sandy loam. Flowering Period, April to July. Height, 4 ins.

P. stellaria.—This bears tufts of wiry stems and narrow leaves. Flowers white and starlike. Site sunny. Soil rich sandy. Flowering Period, May to July. Height, 9 ins. There are numerous garden varieties of this, including *Bridesmaid*, *lilacina*, and *Seraph*.

P. subulata (Moss Pink).—This forms a mass of prostrate stems. Flowers rose-pink. Site sunny. Soil rich sandy. Flowering Period, April to July. Height, 3 ins. Numerous varieties of this are grown. See article above.

See also *Water Garden : Plants for the.*

PHOENICIAN JUNIPER (*Juniperus phoenicea*).—See *Trees.*

PHŒNIX.—For the best species see *Palms.*

PHŒNIX PALMS. — See under Phœnix in *Palms.*

PHORBIA.—See Cabbage Root Fly and Onion Fly or Maggot in *Insect Pests.*

PHORMIUM (Flax Lily, New Zealand Flax, etc. Nat. Ord. Liliaceæ).—Only a few of the somewhat numerous species and varieties of this are worth cultivating in general gardens. Botanically they are hardy herbaceous perennials succeeding in rich loam inclined to be clayey. They are not difficult to propagate by root division in the spring, which is also the best time for planting. We recommend the following :—

Phormium cookianum (Syns. *P. Colensoi* and *P. forsterianum*).—This bears yellow flowers from June to August, and grows 4–6 ft. high.

P. robustum.—This is a strong-growing sort similar otherwise to the above.

P. tenax.—Of the many varieties of this popular species probably the best is *variegatum*, the flowers of which are a somewhat unattractive whitish-green, and the foliage striped with gold. The plant blooms from August to September, and grows about 6 ft. high, and sometimes more.

PHOSPHATE OF AMMONIA.—See Ammonium Phosphate in *Ammonia and Ammonium Compounds.*

PHOSPHATE OF LIME.—See Calcium Orthophosphates in *Lime Compounds.*

PHOSPHATE OF POTASH. — See Potassium Phosphate in *Potash and Potassium Compounds.*

PHOSPHATE OF SODA.—See Sodium Phosphate in *Soda and Sodium Compounds.*

PHOSPHATIC MANURES and PHOSPHO-NITROGENOUS MANURES.—See *Manures.*

PHOSPHORIC ACID.—See under Phosphorus in *Chemistry for Gardeners*, also *Acids : Their Uses in Horticulture.*

PHOSPHORUS.—A few notes on this useful element will be found in *Chemistry for Gardeners.*

PHOTINIA.—For the best species see *Shrubs.*

PHOTOSYNTHESIS.—See under Food Synthesis and Transpiration in *Plant Physiology.*

PHRAGMITES (Reed. Nat. Ord. Gramineæ).—One species of this is sometimes offered to unwary amateurs. This, *P. communis*, is the common Spire Reed of the ditches, a plant to be given a wide berth.

PHUOPSIS (Nat. Ord. Rubiaceæ). One species of this is sometimes grown in the herbaceous border as it is a hardy perennial of very easy culture, and quickly propagated by root division in March. The species referred to, *P. stylosa* (Syn. *Crucianella stylosa*), is a pretty pink summer blooming plant about 9–12 ins. high, its only disadvantage being the strong, rather unpleasant smell of its flowers.

PHYCOMYCETES.—A group of Fungi. See *Fungous Diseases.*

PHYGELIUS.—See *Cape Figwort.*

PHYLLOCACTUS.— A genus of cactaceous plants. See *Cacti.*

PHYLLOSTACHYS.—See *Bamboos.*

PHYLLOTRETA.—See Turnip Flea Beetle in *Insect Pests.*

PHYMATODES.—Now included in the genus POLYPODIUM, for which see *FERNS AND FERN GARDENING.*

PHYSALIS (WINTER CHERRY. Nat. Ord. Solanaceæ).—This is a genus of herbaceous perennials which are hardy in the warmer parts of the British Isles. They do not require anything special in the way of culture beyond a rich soil and a sheltered site in the borders. Propagation by seeds, cuttings, and root division at the usual time is not a matter of much difficulty, while the best planting period is from early March onwards. We recommend the following, especially the first two; these bear attractive red seed capsules after blooming which are useful for winter decoration:—

Physalis Alkekengi (BLADDER HERB).—This bears white flowers from July to September, on plants about 1½ ft. high.

P. Bunyardii.—This is a handsome white-flowered hybrid of the above. It is more free flowering, and has larger seed pods.

P. edulis.—Syn. *P. peruviana* below.

P. Francheti.—This is a white species blooming from August onwards, and averaging 1½ ft. in height.

P. peruviana (Syn. *P. edulis*).—This is the well-known CAPE GOOSEBERRY, bearing yellow or white flowers from July onwards, and growing 3–4 ft. in height.

PHYSICS.—See *EDUCATION AND GARDENING.*

PHYSIOLOGICAL DISEASES.—These are referred to in our article on *FUNGOUS DISEASES.*

PHYSOSTEGIA.—See *FALSE DRAGON'S HEAD.*

PHYTEUMA.—See *HORNED RAMPION.*

PHYTOLACCA (POKEWEED. Nat. Ord. Phytolaccaceæ).—This is a small and not very important genus of hardy perennial plants (the half-hardy sorts being hardly ever grown). All the species described below will succeed in light rich soil in a sunny site if given the usual treatment for perennials, and are most easily propagated by seeds sown in the summer, or by root division in March, which last is also the best planting period.

Phytolacca acinosa (Syn. *P. esculenta*).—This, the INDIAN POKE, bears lilac-purple flowers and blooms in August. It grows about 4–5 ft. high.

P. bogotensis.—This is a tender white species blooming in June, and growing about 1 yd. high.

P. decandra (Syn. *P. vulgaris*).—This, the VIRGINIAN POKEWEED or POKEBURR, is quite the most favourite species of all. It bears white or pale purple and lilac flowers from June to August, followed by purple berries, and grows about 3–4 ft. high.

P. esculenta.—Syn. *P. acinosa,* which see.

P. icosandra (Syn. *P. purpurascens*).—This bears unattractive greenish-purple flowers in July, and where space is precious may be dispensed with. It may be planted in the wild garden or shrub border, where it will grow about 1 yd. in height.

P. octandra.—This bears greenish-white flowers in September and is only useful for a warm spot in the wild garden. It grows about 1 yd. in height.

P. purpurascens.—Syn. *P. icosandra* above.

P. vulgaris.—Syn. *P. decandra* above.

PHYTOMYZA.—See CABBAGE LEAF AND STALK MINER and MARGUERITE FLY in *INSECT PESTS.*

PICEA.—For the best of the numerous species see *TREES.*

PICHI (*Fabiana imbricata*).—See *SHRUBS.*

PICKLING CABBAGE.—See *RED CABBAGE, or PICKLING CABBAGE.*

PICKLING ONIONS.—See *ONION.*

PICKLING PLANTS.

The following is a list of the chief pickling plants, articles on the culture of which appear elsewhere in this work. It should be remarked that the term "pickling" is used in its widest sense, to include not only those plants pickled in vinegar, but also some pickled in sugar or salt, as, for instance, Angelica and Beans:—

Angelica.
Beans of many kinds.
Beetroot.
Broccoli.
Capsicum.
Carrot.
Cauliflower.
Chili.
Chives.
Cucumber.
Cummin.
Egg Plant.
Garlic.
Gherkin.
Gourds.
Leek.
Nasturtium Seed.
Onion.
Radish.
Samphire.
Shallots.
Tomato.
Unicorn Plant.
Vegetable Marrow.
Walnut.

PICNOMON.—Now included in the genus *CNICUS.*

PICOTEE (Nat. Ord. Caryophyllaceæ).—Hardy perennial, 2½–3 ft. high, succeeding in compost of turfy loam two parts, leaf-soil and old manure half a part each, with some mortar rubble if grown in pots. For the open border, a well-drained substantial loam, enriched with manure, and containing lime in some form, is suitable. Burnt garden refuse is also recommended. New varieties are propagated by seeds. For perpetuating the named sorts layering is necessary.

Culture.—Sow seed in March or April in pots or boxes of light soil in a cold greenhouse or frame. Prick out before any crowding interferes with growth, and finally plant in a prepared bed in September or early October. Take layers as for Carnations. These will root in six or eight weeks. They may then be potted into 4-inch pots in good soil and, if to be grown under glass the following year, wintered in a frame or cold house. In February or March the pots will be well filled with roots. Then transfer the plants to their flowering quarters, one plant in a 6-inch pot or two in a 7½-inch pot.

Although strictly a hardy plant, the white-ground Picotee has, through generations of culture under glass, lost the robustness of its original constitution, and is now solely grown in the cold greenhouse. Frost will not injure it, but the dampness of our winters is too trying to this aristocrat of the floral world. The yellow-ground Picotees are more amenable to border culture, but this is probably entirely owing to their more recent evolution. The flowering season is July and August.

Varieties: — *Yellow Ground.* — Eclipse, Exquisite, Her Majesty, John Ruskin, Margaret Lennox, Mrs J. J. Keen, Onward, Santa Claus, Togo.

White Ground. — Fair Maiden, Henry Kenyon, John Smith, Lavinia, Liddington's Favourite, Mary D. Anstiss, Perfection, Polly Brazil, Radiant.—J. L. G.

PIERIDÆ. — See CABBAGE WHITE BUTTERFLIES in *INSECT PESTS.*

PIERIS.—For the best species see *SHRUBS.*

PIG MANURE.

Pig dung is one of the most smelly materials a gardener ever has to handle, and for this reason alone cannot be used in a fresh state in the vicinity of dwelling-houses. Nor is it easy to use it on suburban allotments without running serious risk of a visit from the Inspector of Nuisances and a consequent summons.

Where, however, facilities exist for making use of it (and this is usually possible in the neighbourhood of country farms) the opportunity should be seized, for though pig manure is so offensive, it is good stuff, and wonderful crops have been produced by its use on light and medium soils. Let it, however, be clearly understood that fresh pig dung is quite useless for all gardening purposes, and that however old it may be it should not be used on strong heavy clay soils.

Pig-sty Refuse. — The common practice now, and the almost universal practice ten or twenty years ago was to allow one's pigs to wallow in all the dirt of the day. The sties are usually large and, instead of being kept as clean as the proverbial new pin, they were, and, alas, still are in many cases, the incarnation of all that is filthy. Manure from the stables, cow-dung from the byre, and the sweepings of the farmyard are frequently shot into the pig-sty for the pigs to wallow amongst. Household refuse of a varied nature is usually thrown in too for the pigs to eat. The resulting manure is a mixture of indefinite composition and may be used in the same way as *FARMYARD MANURE*, upon which we devote a separate article.

Pure Pig Manure. — The more progressive pig-keepers are now departing from the above practice, and do not allow their pigs to wallow amongst every kind of filth in the way indicated. Clean straw is provided for them to lie on, and the dung is removed daily with the soiled straw. This is the powerful material so useless in its fresh state, but which gardeners working light soils should purchase in as large a quantity as possible. It is, as every one who has handled it knows, a watery solid the odour of which is very penetrating.

The best way to turn this material into valuable manure is a matter of opinion. Some advocate mixing large quantities of lime with it, but if this is done much of its value is lost. The best way seems to be to mix it with nearly as much as its own bulk of poor garden soil, or vegetable refuse, the latter for preference. A conical stack of the mixture should then be made in an out-of-the-way spot, and after being beaten firm this should be covered with a 6-inch layer of soil to which ground gypsum has been freely added. The heap should be allowed to mellow down for about a year; it can then be dug out, and this covering soil mixed in, after which it will form a fine material for winter manuring, if used at the rate of 3–5 cwt. per sq. rod.

It is needless to add that the gardener should only work amongst pig manure on a full stomach, and that if hard materials, such as dried bracken or green fern, are used for bedding the pigs in the absence of straw, a somewhat longer period should be allowed for the material to rot before it is used.—E.

PIG-NUT (*Carya porcina*). — See *TREES*.

PIG NUT (*Carum Bulbocastanum*).—See *CARUM*.

PIG-STY REFUSE.—See *PIG MANURE*.

PIGEON DUNG. — See *POULTRY MANURE*.

PILEWORT (*Ranunculus Ficaria*).—See *RANUNCULUS*.

PILLAR FORGET-ME-NOT (*Myosotis stricta* and *M. Sutton's Gem*).—See *FORGET-ME-NOT*.

PILLAR ROSES.— See under ROSES FOR PILLARS in *ROSES FOR ALL PURPOSES*.

PILOCEREUS. — A genus of cactaceous plants. See *CACTI*.

PIMPERNEL.—See article on *ANAGALLIS*, and under SCARLET PIMPERNEL in *WEEDS*.

PIMPERNEL, THE BOG (*Anagallis tenella*).—See *ANAGALLIS*.

PIMPINELLA.—See under ANISEED in *MEDICINAL HERBS*.

PIN OAK (*Quercus palustris*).—See *TREES*.

PINE.—For the best sorts see PINUS in *TREES*.

PINE BEETLE.—See *INSECT PESTS*.

PINE NEEDLES.

These are of no value to the gardener except for starting his wood fire. They prove detrimental when dug into the ground and ruin the resulting leaf-mould if mixed and allowed to rot with leaves.

PINE WEEVIL.—See *INSECT PESTS*.

PINGUICULA (BUTTER-WORT. Nat. Ord. Lentibulariaceæ).—This is a genus of hardy alpine aquatics of little garden value. *P. alpina* (Syn. *P. flavescens*) and *P. grandiflora*, bearing white and blue flowers respectively, are sometimes grown in the water garden. The best known species is, however, *P. vulgaris* (Syn. *P. Gypsophila*), popularly known as the BOG VIOLET, bearing small purple-violet flowers in April and May. The height of all the above species averages 3–6 ins.

NEW VARIETY.

Pinguicula Renteriana.—This has rose flowers mottled with purple in the throat. It thrives best in moist soil in the rock garden.

PINK (Nat. Ord. Caryophyllaceæ). A hardy perennial, 9–12 ins. high, succeeding in ordinary garden loam, preferably containing lime or mortar rubble, and propagated by seed, layers, cuttings, or pipings.

Culture.—Seed sown in boxes or in the open border in April and May will produce strong bushy plants by September, when these should be planted firmly in their flowering quarters. Layering is not frequently resorted to, as pipings and cuttings root very readily and take much less time to prepare. After the flowering season the current year's "grass" will be in good condition for treating in this manner. Pipings are secured by severing, with a sharp upward pull, the top portion of the young growths about 3 or 4 ins. long, and inserting them in sandy soil in a shady position, the lowest pair of leaves being removed to form a short stem. Some of the side-growths will be found sufficiently short to be taken with a "heel" from the old stems and used as cuttings. If the weather is hot and dry, overhead syringing will facilitate rooting. In about six weeks the young plants can be moved to their permanent quarters.

USES.—The Pink is an excellent subject for bordering or edging, the evergreen glaucous foliage having a pleasing effect even when the plants are not in bloom; but more use might be made of them planted in clumps in the rockery.

Varieties.—Many new sorts have been introduced lately which are a distinct advance on the older varieties, such as Mrs Sinkins. The following are particularly fine: Apple Blossom, Aviator, Bookham Gem, Border Chief, Charm, Dido, Emperor, General Joffre, Glory, J. L. Gibson, Jasper, King Pink, Progress, Radiant, Snowdrift, The Gem, Vesta, White Queen.—J. L. G.

See also *INDIAN PINKS AND JAPAN PINKS*.

PINK LUPINE (*Lupinus polyphyllus roseus*).—See *LUPINE*.

PINUS.—For the best species see *TREES*.

PINXTER FLOWER (*Azalea nudiflora* or *Rhododendron nudiflorum*).—See *AZALEA: HARDY SPECIES*, and *RHODODENDRON*.

PIOPHILA.—See CELERY STEM FLY in *INSECT PESTS*.

PISTACHIO NUT.—See *NUT CULTURE*.

PISUM (PEA. Nat. Ord. Leguminosæ).—The most important species in this genus is *P. sativum*, the COMMON PEA, CULINARY PEA, or GARDEN PEA (see article on *PEAS*). Others, such as *P. arvense*, the FIELD PEA, and *P. elatius* (Syns. *P. biflorum* and *P. thebaicum*), the MUMMY PEA, are grown in the garden to a much more limited extent. Some authorities give *P. arvense* as a synonym of *P. elatius*; in other words, they call the FIELD PEA and the MUMMY PEA by the same name, which is absurd, as the two are such different plants.

PITCH PINE (*Pinus rigida*).—See *TREES*.

PITCH PINE, TRUE (*Pinus palustris*). See *TREES*.

"PITCHFORK" TREES.—See under PLANTING DISTANCES in *FRUIT CULTURE, HARDY*.

PITH MOTH.—See *INSECT PESTS*.

PITTOSPORUM.—For the best species see *CLIMBING AND TRAILING PLANTS*.

PITYROSPERMA.—Now included in the genus *CIMICIFUGA*.

PLAGIANTHUS.—For the best species see *SHRUBS*.

PLAITED SNOWDROP (*Galanthus plicatus*).—See *SNOWDROP*.

PLANE.—For the best sorts see PLATANUS in *TREES*.

PLANNING GARDENS.—See *GARDEN PLANNING* and *GARDEN PLANS*.

PLANNING NEXT YEAR'S GARDEN. See *AUTUMN GARDEN, THE*, and *WINTER GARDEN, THE*.

PLANNING VILLA GARDENS.—See *VILLA GARDENING*.

PLANS.—See *GARDEN PLANS*.

PLANT PHYSIOLOGY.

If we pull or dig up a plant and, after washing its roots free from adhering soil, weigh it, then dry it thoroughly in a warm place, and weigh it again, we find that water has formed a very large proportion (often well over 90 per cent.) of the substance of the fresh plant. If we chop up the dried plant and heat the pieces strongly in a crucible or hard glass tube, they become first blackened (charcoal), and finally only a greyish powder (ash) remains. By collecting the gases given off during the burning (oxides of carbon, of hydrogen, and of nitrogen), we prove that the largest component of the dried plant consisted of carbon. The ash consists of oxides and salts containing the elements calcium, chlorine, iron, magnesium, phosphorus, potassium, sodium, etc.—in fact, ash analyses have revealed the presence in plants of every element found in the earth's crust, mostly in mere traces. To find out which of these elements are essential for the nourishment and growth of plants, we grow plants with their roots dipping into a *Culture Solution*, namely, water, to which is added various salts; and we find that all ordinary green plants thrive and grow, just as if they were rooted in the soil, if the solution contains the nine elements calcium, hydrogen, iron, magnesium, nitrogen, oxygen, phosphorus, potassium, and sulphur. We could have predicted that hydrogen, nitrogen, oxygen, phosphorus, and sulphur are essential, for these five elements, together with carbon, make up the actual living substance (*protoplasm*) of both plants and animals. Now, the usual culture solution contains no carbon or carbon compound, nor does a plant make use of one if it is added. Hence we know that the all-important element carbon comes from the air, as carbon dioxide ("carbonic acid gas"), a fact very easily proved by simple experiments.

Tissues.—Some of these points will be considered later, but we must now concentrate attention on the processes by which plants manufacture their food. The microscopic structure of plants cannot be dealt with here in detail, but the tissues are divided into three chief parts. (1) CONDUCTING TISSUES, including the woody parts of the root and stem and the leaf veins. Besides the wood vessels up which water passes, special tubes (*sieve-tubes*) for carrying certain foodstuffs from the leaves to other parts of the plant are also included in these tissues. (2) GROUND TISSUES, more or less spongy in texture, since these include air-spaces. In root and stem these serve mainly for food storage, but in the leaf the ground tissues are green, and are the seat of the most important process in plant life. (3) PROTECTIVE TISSUES, which serve mainly to prevent escape of water, but which in the root bear countless fine hairs which absorb water and salts from the soil, while in the leaf these tissues are perforated by small openings (*stomata*) through which important exchanges of gases take place between the outer air and the air-spaces within the plant.

Food Synthesis.—By a remarkable series of processes, green plants, alone of all living things, build up organic compounds from the carbon dioxide of the air and a few elements absorbed from the soil. The first step (*Carbon Assimilation*) is the splitting up of carbon dioxide and water, and the rearranging of the elements carbon, hydrogen, and oxygen so as to produce simple organic compounds. There are intermediate products, but finally sugars are formed. Some of the sugar is at once used up to supply energy to the green tissue itself, some passes along the conducting tissue to parts of the plant which are growing or are storing food, while some is temporarily changed into the allied, but insoluble substance starch, for storage in the green leaf tissue itself. Starting from sugar, various other organic compounds are built up containing (besides carbon, hydrogen, and oxygen) the elements nitrogen, phosphorus, and sulphur, and finally the living substance protoplasm itself is produced. Of these two sets of synthetic processes—carbonic acid to sugar, sugar to protoplasm—the first (*Carbon Assimilation*) depends absolutely upon light, and occurs only in the green leaf, while the second is independent of light, and may be carried on in any part of the plant. We may call the first *photosynthesis*, and the second *proteid-synthesis*.

A little reflection shows the unique and fundamental importance of these synthetic processes, which green plants alone can carry on, and upon which all other living things are directly or indirectly dependent for their food, and therefore for their life. We know very little about the later stages, but as regards *photosynthesis*, we know that the green matter (*chlorophyll*) of leaves absorbs the red and blue rays of the mixed (white) light falling on it, and that the absorbed rays somehow supply the living protoplasm with the energy required to carry out the synthesis of sugar from carbonic acid (*i.e.* carbon dioxide from the air, dissolved in water derived from the soil). The vast importance of having the plant's leaves well exposed to the light and air is thus obvious.

Essential Elements.—The reason why six out of the ten "essential elements" *are* essential is clear enough from the fact that they are constituents of protoplasm itself. But why are the other four also essential? As to iron and magnesium the reason is clear—without these elements the green matter (*chlorophyll*) cannot be formed; magnesium actually enters into the composition of chlorophyll, but as iron does not, the precise part played by iron is not clear. Potassium is an ingredient in certain organic compounds, found especially in some crucifers (*e.g.* "oil of mustard"), but apparently its chief functions are somehow connected with carbon assimilation and with the transport of organic foodstuffs in the plant. Calcium compounds (lime salts) are also concerned in some way in photosynthesis and proteid-synthesis, besides combining with, and converting into a harmless insoluble salt, a poisonous by-product (*oxalic acid*) formed in these synthetic processes, while its compounds also enter into the composition of, and give additional strength to, the supporting (cell-wall) framework of plant tissue.

Besides the ten elements which are essential and sufficient for healthy growth of all green plants (so far as known from water culture experiments), a few others occur in considerable amount in certain plants. In some cases these additional elements certainly make for more robust growth; for instance, grasses and cereals store up silica (from quartz, flint, or sand) to stiffen their stems and leaves, while common salt (*sodium chloride*) seems to promote the growth of plants of the goosefoot family (spinach, beetroot, etc.), as well as some of the few edible umbelliferæ, notably the carrot.

Respiration.—Plants, like animals, use organic foodstuffs as material for tissue formation in their growth, and as "fuel," which is slowly burned or oxidised, in order to supply energy for the various functions of life. Actual locomotion, characteristic of animals (often only in early life, as in oysters and other sedentary animals), is, in the vegetable kingdom, seen only in lowly microscopic plants, and in certain reproductive cells of higher ones; but more or less active streaming movements of protoplasm can be seen with the miscroscope in all plants—for instance, in the green cells of leaves, the protoplasm moves so as to place the disc-like chlorophyll grains broadwise in moderate light, but edgewise in too intense light which injures the chlorophyll. Also, energy is expended in the chemical transformation undergone by the organic foodstuffs in plants, just as in animals; these foods are oxidised, with the setting free of heat and of carbon dioxide, besides other waste products which are stored inside the plant, instead of being excreted as in animals and man. In plants, as in animals, part of the energy produced by oxidation (*respiration*) is set free as heat, but in plants this occurs slowly, and the heat is soon dissipated so that the tissues take the temperature of the air around; though in germinating seeds and opening buds and flowers, respiration may be as active as in warm-blooded animals, and the temperature rise by several degrees. The oft-repeated steam-engine analogy applies to plants just as to animals or our own bodies; and a free supply of air containing the necessary oxygen for respiration is as important for plant life as for that of animals. For instance, the functions of the root, and therefore those of the rest of the plant, suffer (1) if the soil is waterlogged (*i.e.* if the air between the soil grains is replaced by water, as may happen naturally in heavy clayey soil during prolonged wet weather, or in any soil if it is over-watered); and (2) if seeds are planted too deeply in the soil, since the lower parts of most soils contain much more water and far less air than the upper part. A well-ventilated soil then is a most important condition for the healthy growth of plants. The ground tissue of roots contains air-spaces continuous with those in stem and leaves, and this internal ventilation system is specially well developed in marsh and aquatic plants, but ordinary land plants must also have a well-ventilated soil to grow healthily in.

Transpiration.—A leaf plucked from a living plant, or a pulled-up seedling, after a time becomes limp, then dry and withered, and finally dies owing to loss of water in the form of vapour. This loss occurs chiefly from the leaves through the pores (*stomata*), which, as a rule, are most numerous on, or confined to, the underside of the leaf. Through these pores there is communication between the air-spaces, or ventilation system, inside the plant and the atmosphere outside. Through them also occur the exchanges of gases between plant and atmosphere connected with photosynthesis, respiration, and transpiration. Experiments made on the diffusion of gases through perforated metal discs, also on these three processes in plant life, show how marvellously the green leaf is adapted to its great functions. As to the stomata, at first sight the presence of small pores dotted over the skin-layer would seem a very inadequate means for the entry and exit of gases, but, as a matter of fact (omitting its physical and mathematical explanations), the pores when open are in effect equivalent to a perfectly free surface—that is, as rapid gaseous diffusion occurs as if no skin were present at all! But the pores are not always open, and when they are closed the skin forms a protection against loss of water which might damage or kill the leaf. The two guard-cells which surround each pore are sausage-shaped, and are capable of becoming less curved (which state is termed *pore closing*) or more curved (when the pores are said to be open) according to conditions. Thus the pores open on bright, dry, warm days, and close when it is dull or dark, or when the air is moist or cold.

The leaves have often been likened to the lungs of the animal body, and this is largely correct, for we must remember that the actual surface where exchange of gases between the plant and the atmosphere occurs is not the outer surface of the leaf, but the enormous area presented by the walls of the cells inside the leaf, that is, the walls of the continuous, though labyrinthine air-space system of the plant. The leaf-pores serve simply as the outer doors of entry and exit for the gases concerned—enter carbon dioxide and exit oxygen in photosynthesis; the reverse in respiration—exit water vapour in transpiration. Just as the green chlorophyll-containing leaf-cell is the all-important unit in nutrition (*photosynthesis*), the factory to which are brought the raw materials (carbon dioxide from air, water and salts from soil) which, by aid of the light-energy absorbed by the green grains, are transformed into sugar and other complex organic foodstuffs, so in transpiration the green cell again is the active agent in not only giving out, as vapour, the excess of water drawn up from the soil, but also in the actual drawing-up process itself. We shall study presently the absorption of soil-water, but once water has entered the conducting pipes (wood-vessels) the maintenance of the ascending water stream through stem to leaf is due to the powerful sucking action of the leaf-cells, exerted in the process of osmosis (see below). That is, the transpiration stream is due, not (as still often erroneously taught) to a driving force exerted by the root from below, but to the pulling force of the transpiring leaf-cells from above.

Root Absorption.—This is closely related to nutrition and transpiration. The essential function of the root, besides that of fixing the plant firmly in the soil, is to absorb soil-water, which is a weak solution of various salts. The root may also fulfil other functions, one of the commonest of these being the storage of food (*e.g.* beetroot, potato). The area presented by the root to the soil is increased not only by its copious branching, but by the production of long, fine outgrowths (or root-hairs) which increase its apparent area a hundredfold or more. These hairs, which are long, tubular outgrowths from the skin layer of the root, have an outer wall, lined inside by a film of living protoplasm, while within this again is the cell-sap—a solution of numerous substances, organic and inorganic. Root hairs are best seen in seedlings grown on moist flannel or paper, or simply in damp air; they can rarely be seen if we dig or pull up the root from the soil.

Next to the green leaf-cells, the root-hairs play the most important active part in the nutrition of plants. The root branches in all directions, so as to explore as much soil space as possible by means of the hairs, which are borne just behind the growing tip of each rootlet. The branching root also fixes the plant securely in the soil, so that the wind shall not disturb or break off the finer rootlets and the hairs; the stem and its branches spread the leaves (which are practically layers of green cells) out in the air and light, so as to obtain as much of both as possible, while preventing one leaf from unduly shading the others; and throughout the branching root and stem are the conducting tubes between the root-hairs below and the green cells above. The reader who grasps this broad conception of plant structure can, of course, fill in the many interesting details from further study, but will have nothing to unlearn.

Osmosis.—As to the actual mechanism of root absorption, we can here again give only a general outline; for fuller knowledge reference must be made to books on chemistry, some knowledge of which is essential for the better understanding of plant physiology. It is well known, however, that when two solutions of different strengths are separated from each other by a membrane such as parchment or pig's bladder, the weaker (less concentrated) solution passes through more rapidly than the stronger; hence if we fill a bladder or a parchment tube with salt or sugar solution, and suspend it in water, it will soon swell up very much. That the stretched membrane is under considerable pressure is obvious, for if we prick it the liquid spurts out. After a time (unless the membrane bursts) it will stop swelling and subside to its original size, because from the start the diffusion process has been going on in *both* directions. In other words, water has been passing into the bladder, and solution has been passing out into the water, so that finally we have solutions of equal strength inside and outside it. Roughly, this illustrates the process of *osmosis* which occurs in root absorption; within the root-hair is a solution of salts, sugar, etc., and outside it the soil-water (a weak solution of salts). But the root-hair, besides its dead outer membrane or cell-wall, has an inner layer of living protoplasm, and when the cell-sap reaches a certain concentration, some change occurs in this living layer whereby it regulates the rate at which soil-water is absorbed, and also, at the place where it joins the root tissue, causing part of the cell-sap to escape under pressure into the vessels. Owing to the action of the living layer, the root-hair, unlike a dead membrane, does not swell up and burst, but continuously absorbs soil-water, and passes it on under pressure into the vessels, where it begins its ascent into stem and leaves. This "root pressure" is, in certain circumstances, sufficient to force water right up to the leaves. For instance, at night when the air-pores of the leaves are closed, water may be forced out in drops from special ever-open pores on the edges of the leaf, just where the veins end, as in nasturtium (*Tropaeolum*) or fuchsia; again, in spring, before the leaves have unfolded, sap escapes when twigs of maple, vine, etc., are cut. But this escape of liquid is not transpiration; as a matter of fact, when transpiration is active, as on bright, warm days, the column of water in the wood vessels is broken up by bubbles of water vapour. Paradoxical as it may appear, this column of water (even when so broken up), extending from roots to leaves, behaves like a solid rod—it is drawn up, without any break in its continuity, by the sucking action of the transpiring green cells. Here, again, osmosis comes into action—the wet walls of these cells lose water to the air inside the leaf, hence their cell-sap becomes more concentrated, and they draw water from the vessels in the leaf-veins, which are continuous with those in the stem and root.

"Selective Absorption." — Keeping these principles in mind, we can arrive at clear ideas concerning so-called selective root absorption, a most important process, which is simple enough in reality, but which has often been the subject of confused and erroneous explanations. Root-hairs must, of course, absorb any diffusible substance present around them; for instance, if the root of a plant is set into a poisonous solution, it absorbs this, and as the solution is drawn up it kills the plant. The root is, so to speak, obliged to go on absorbing any diffusible substance present in the soil-water, so long as that substance is used up to form part of the plant's own substance. But if the substance is one of which the plant makes no use, and does not change into some insoluble compound, then it accumulates in the cell-sap, and when the concentration here equals that outside, the absorption of the substance stops. This applies alike to useful and to useless substances. It explains the fact that all plants contain, often as mere traces, various chemical elements besides the nine essential ones absorbed by the root. Since one species differs from another in the relative requirements of even the essential elements, it follows that if the same species is grown in the same mass of soil year after year, the plants may after a time fail to obtain enough of one (or more) of these elements, and will show poorer growth, though the soil may still be rich enough in this element to support the luxuriant growth of a second species, which in turn may impoverish the soil in respect of some other element, and so on. On these facts is based the correct use of manures and artificial fertilisers, as also the rotation of crops, and reference to our articles on these topics will give fuller information.

Besides absorbing water and salts from the soil, roots excrete certain substances *into* the soil-water. Of these the most important is carbon dioxide (produced by respiration, also by the decay of dead root-hairs), and this gas, when dissolved in water, forms a weak acid (*carbonic acid*) which dissolves such substances as carbonates and phosphates of lime and magnesia. Roots also appear to excrete substances which are injurious, at any rate in water cultures, to the growth of other plants of the same species, and this may be an additional factor governing the rotation of crops.

Relations of Plant to Soil.—So far, we have considered the relations between root and soil mainly from the chemical point of view, and have barely touched upon the physical conditions which must also be fulfilled for plants to grow healthily in a soil. The root gets all the organic foodstuffs for its growth from the leaves, through the stem, since (having no chlorophyll) it can manufacture none for itself; like the other non-green parts of the plant, it is, so to speak, parasitic on the green leaf, the food-making factory. But its growth requires suitable conditions as to water and air supply, warmth, soil texture, etc.; and besides these various physical factors, which in their influence on plant growth may cooperate or clash with each other in a most complex manner, we have biological factors, such as the presence and activities of insect larvæ, earthworms, fungi, protozoa, and bacteria, of which some are beneficent and others injurious in their influence on soil fertility.

The reader will, of course, understand that a general discussion of soil questions cannot be given here. Details as to the use of manures and fertilisers, and as to cultivation generally, as well as the special cultural requirements of different species, will be found throughout this work.

Food Storage and Digestion.—As already explained and emphasised, the green plant has the unique and fundamental power, by virtue of its chlorophyll apparatus, of converting the simple inorganic raw materials, carbon dioxide and water, into sugar, which in turn forms the starting-point for further synthetic processes in which nitrogen, sulphur, and phosphorus are worked up into more complex foodstuffs (amino-acids and proteins) which are finally incorporated into the actual living substance called protoplasm. It is true that in the all-important early steps of this synthetic series the green plant is sharply distinguished from all other living things, which therefore depend upon it for their existence. In the animal body, we must begin with already complex foodstuffs, and those containing nitrogen, sulphur, and phosphorus are essential for life. The important point to be noted now is that the actual organic foodstuffs themselves are precisely the same in plants and animals, namely, carbohydrates (sugar, starch, etc.), fats, and proteins; and further, the *fate* of these substances is the same in both cases, that is, they are either used as material for growth, or oxidised in order to provide energy (already discussed under the heading RESPIRATION), or stored for a longer or shorter time before being used in one or other of these two ways.

When stored, generally in insoluble and indiffusible form (*i.e.* incapable of passing through membranes), these foodstuffs must be converted into a soluble and diffusible form which can pass from cell to cell, by the process of diffusion (osmosis), to the parts which require food for immediate or future growth. This conversion is effected, just as in the animal body, by the action of the remarkable substances called ferments (*enzymes*). Most of these ferments are so strictly specialised that each acts upon only one kind of foodstuff. - Without discussing the matter more fully, we may say the action has been compared with that of a lock and a key, and that as there are numerous combinations of locks (the more complex and less soluble or less diffusible foods) there is a correspondingly large number of keys (ferments or enzymes) to fit them and to open the door, or in other words, to convert the locked-up substances into simpler, more soluble and diffusible ones. Ferment action is very different from that of a mere solvent or dissolving substance; for if we add hydrochloric acid to lime, for example, we get a new salt (chloride) of lime, which is soluble, but the acid is used up in the change; whereas one peculiarity of ferments is that an infinitesimally small quantity can go on continuously converting, say, starch into sugar, without itself undergoing any final change or loss so long as the sugar is removed from the field of action.

The green leaf manufactures food so long as the light shines on it, and other conditions are favourable; at nightfall it contains a surplus of food in the form of minute starch granules, embedded in the green chlorophyll grains; the ferment diastase changes this starch back into sugar, which travels in solution to parts which are growing (roots, buds, young leaves, flowers, etc.), or which are laying up a reserve store of food for future growth (seeds, rhizomes, tubers, bulbs, etc.); in these storehouses the sugar is changed back once more into starch, which is deposited in granules in or around grains (*leucoplasts*) resembling the chloroplasts, but containing no green substance. So the cycle goes on; so long as life and growth proceed, dissolved food is used up or stored up, and thus a stream of diffusion sets in from the food-making or food-storing parts of the plant to the parts where active processes are carried on, and where food is used up. The storage is merely temporary, though it may last from autumn to spring (bulbs, rhizomes, etc.) or for some years (seeds); when the time of need comes, ferments convert the stored food into diffusible food, and this streams to the places where it is required.

Growth.—Growth in plants, as in animals, involves not merely increase in size, but the building up of additional living substance (*protoplasm*) at a greater rate than it is broken down; that is, growth normally implies an excess of construction over destruction, so that material and energy are stored up faster than they are lost. It is obvious that growth may proceed actively in some parts of the plant at the expense of others, so that for a time the plant may show great increase in size but a loss in dry weight, as, for instance, in germinating seeds or sprouting tubers, etc.; but as soon as the young leaves unfold, become green, and receive the light, progressive growth, with increase of organic substance, begins, and continues during the growing season. Apart from intake of water, which is essential for all vital processes, and a supply of foodstuffs, growth requires oxygen and a suitable temperature. Growth takes place in all parts of the plant where there is living substance, but is especially active in the layer (*cambium*) which produces new conducting tissue in stem and root; in the cork-forming layer of old stems and roots; at the ends of roots and stems; and in the young leaves.

From what has been said here and in preceding paragraphs, it is obvious that normal healthy growth depends on the proper functioning of the green leaf-cells and the root-hairs. The leaves must have light and air in order to manufacture food; the root-hairs must be so placed as to explore the soil-spaces for water and salts. Hence the leaf-bearing shoots should not be closely crowded together so that the leaves unduly overlap and shade each other; while the soil should, besides containing the necessary salts and water, be of such texture that the growing root-tips (bearing the absorbing root-hairs) can reach out in all directions and come into intimate contact with the soil-grains. All the operations of culture—pricking-out, pruning, thinning, weeding, pest-destroying, watering, manuring, tillage, etc.—are directed towards promoting and, as far as possible, guiding in the right directions, the work of the green leaf-cells and the root-hairs, whether the outcome of growth be desired for pleasure or profit or both.

Movement.—Apart from internal protoplasmic streaming, plants show movements of various kinds, but we need consider here only those due to growth. These growth movements are also called "tropic" or "turning" movements, because unless and until the organ concerned has taken up its proper direction of growth, and reached the best position for the work it has to do, it does this by curvature due to growth taking place more rapidly, or solely, on one side of the growing root, stem, or leaf. The growing organs are exposed to the stimuli of light, gravity, moisture, chemical substances, contact with solid objects, etc. They frequently respond to these stimuli by growing towards the source of stimulation. At times, however, they grow away from it, or adopt a "neutral" attitude, *i.e.* growing at right angles to the line of stimulation.

Everyone has observed examples of such movements, *e.g.* the bending out of stems towards light falling from one side; the turning upwards of the growing tips of shoots that had been beaten down by rain or wind, etc. Unless one has performed or seen some simple experiments, however, it is difficult to realise what an important part growth movements play in plant life, or even that they take place at all, much less that they occur with great force, *i.e.* that the part concerned can overcome very considerable resistance in carrying out its movement.

The main stem responds to the stimulus of light by growing erect if in the open, but at an angle if the light comes mainly from one side; the leaves set themselves at right angles to the light, while branches move into a definite position intermediate between vertical and horizontal; thus the leaves are spread out so as to catch the maximum of the available light. The main root grows away from the light and towards moisture. It also grows vertically downwards, not in a merely passive manner, but with considerable force, towards the earth's centre, *i.e.* it is guided by the stimulus of gravity.

The first set of side-roots grow out in a direction below the horizontal; while the further branches from these simply grow at right angles to their parent, so that some grow upwards. In this way the root systematically explores the soil, its branches coming into contact with the largest possible soil volume with the minimum expense of material, *i.e.* unnecessary overlapping of rootlets is avoided. In brief, so far as the stimuli of gravity, light, and moisture are concerned, the main stem and main root grow in opposite directions (towards and away from the stimulus) along the line of stimulation, while branches and leaves and the main rootlets take up a more or less horizontal position. Moreover, in each case there are remarkable "perception organs," which receive the light and gravity stimuli and transmit them to the growing cells which carry out the movements.

Life History of Flowering Plants.—The necessarily brief and general outline of plant life here given may be concluded by a few remarks on reproduction by seed. The plant begins life as an egg, a small cell embedded in the ovule or future seed, which is contained in the future seed-vessel (*ovary*) of the flower. The flower also produces, in the pollen sacs of its stamens, minute pollen grains which are ultimately transferred, either by insects, the wind, or human agency, to the receptive portion (*stigma*) of the ovary. The rest of the flower serves for protection of these essential parts, and for the attraction to them of insects which transfer pollen to stigma, and we find many wonderful adaptations whereby cross-pollination—which means eventually the blending of protoplasm from two distinct parents in the production of seed—is promoted. Placed on the stigma, the pollen grain sends out a fine tube which carries protoplasm from the male parent into the ovule and finally to the egg, where the two protoplasms blend; the tube is guided on its journey by chemical substances produced by the ovule, *i.e.* it shows growth movement in response to chemical stimulus. The fertilised egg grows and becomes the embryo or young plant; the ovule containing it becomes the seed; and the ovary becomes the seed-vessel. Inside the seed, either in the first leaves (*cotyledons*) of the embryo itself, or in a special tissue (*endosperm*) within the seed-coat, but outside of the embryo, there is stored up, as the seed ripens, a reserve of food (starch, proteins, oils, etc.); then the seed becomes firm and dry by loss of moisture and, protected in its coat, is able to endure extremes of heat or cold, and to remain dormant until its germination is evoked by the right conditions as to warmth, water, and air. These stimulate the root and shoot of the embryo into resuming their growth, which is carried on at first at the expense of the stored food, but ere long the seedling shoot has green leaves up in the air and light, and can then make food for itself.

Besides serving as a means for blending the characters of the parents, seed formation is on the whole the best method of perpetuation, since the mature dry seed is remarkably resistant to adverse external conditions; also, of course, the seeds are dispersed by such agencies as wind or animals, often to a considerable distance, so that the offspring are not crowded together. Other organs of perpetuation (tubers, bulbs, etc.) resemble seeds in that they contain reserve food for the growth of buds and roots, which give rise to new plants after the resting period has passed, and conditions have again become favourable for active growth. In all these cases, as in seeds, the stored food was originally manufactured by green leaves.

Throughout its life cycle, the plant is exposed to the various and varying conditions which make up its environment, and it responds to changes in the environment—in the light falling on it, the air around its leaves, the soil in which it is rooted—by modifying its behaviour in such a way as to adapt itself to these changes, and thus to succeed in the struggle for life. In a wider sense, the environment exerts a passive selective action on the race as a whole; when we speak of "natural selection" in connection with the origin of varieties or species, all we mean is that variations from the average or normal are subjected to the sifting action of the environment, which determines whether or not they shall survive and perpetuate the new forms which have arisen, either by small differences among the offspring of the same parents, or by more marked and sudden steps (mutations, sports). Further details will be found in the article on *HYBRIDISING AND CROSS-BREEDING*.—F. C.

PLANTAGO (PLANTAIN, Nat. Ord. Plantagineæ).—This is a large genus of hardy herbaceous plants of no value whatever for gardens. Most of them are excessively troublesome weeds, and of these we may mention the HARTSHORN PLANTAIN (*P. Coronopus*); the RIB GRASS (*P. lanceolata*); the GREATER PLANTAIN or WHITE MAN'S FOOTPRINT (*P. major*); and the LESSER PLANTAIN (*P. media*). See article on *WEEDS* for means of control.

PLANTAIN. — See under GREATER PLANTAIN, HOARY PLANTAIN, and RIBWORT PLANTAIN in *WEEDS*. See also *PLANTAGO*.

PLANTAIN LILY.—See *FUNKIA*.

PLANTATION LILY.—See *FUNKIA*.

PLANTATIONS OF TREES: THEIR PURPOSE.—What is the purpose of a plantation of trees? This is a question which it seems landscape gardeners and those who have to lay out estates have neglected, since plantations are noticeable throughout the country which have been placed with practically no regard to their purpose. This seems a pity, for plantations, though lovely enough in themselves, may, if carelessly planted, mar instead of beautify a garden or estate.

One of the purposes of a plantation of trees is to block out ugly adjacent buildings or to conceal the view of houses, mines, quarries, railways, tram tracks, works, and so on, in the distance. The present writer knows of several gardens within five minutes' walk of towns, and surrounded by villas on all sides, yet one could not but imagine once in them that it was the heart of the country. This is all done by the skilful use of plantations of trees.

Yet another use of plantations is to form a suitable background for herbaceous colour borders. Here the taller shrubs mentioned in our article on *Shrubs* might serve this same purpose, though where the view is extensive trees would be necessary.

Probably the most important purpose of plantations of trees is that of wind screens, since in exposed districts, unless something of the kind is arranged, the more delicate plants cannot live at all.

Care should be taken that plantations of trees do not block out the sun from the garden, since sunshine is an absolute essential. Plantations which commence to do this have defeated their object, and should be promptly cut back to let light in.

One of the quickest growing trees is the sycamore. It is thus useful where a plantation is needed urgently.—E.

PLANTING.

This, next to sowing, is probably the most important of the gardener's operations, for on it depends the success or failure of his subjects to a considerable extent. It is proposed to give a few brief practical hints on the subject in this article.

Before attempting to do any planting, the soil should be well prepared and, very preferably, deeply trenched, keeping the bad sour subsoil in its place down below, but nevertheless breaking it well.

Planting, since it varies so much, is dealt with under separate headings.

Annuals and Bedding Plants.—These should be planted with a trowel in straight or curved rows, clumps or circles. Where clumps are used they should be proportionate to one another, for nothing looks worse than a gigantic clump of one plant here and a tiny patch of something else close by. When there is a view of the border from the house, it should be planted as is shown by the dots (representing plants) in Fig. 1, and not in the manner pictured at Fig. 2. If this last way is adopted, the soil between the rows is seen even

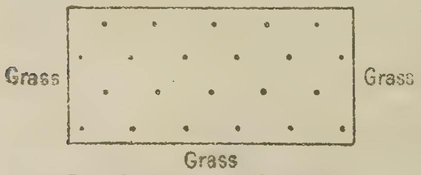


Fig. 1 Correct Way of Planting Annuals or Bedding Plants.

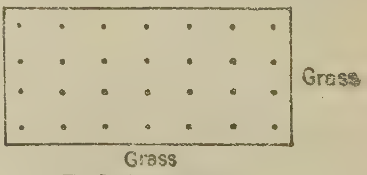


Fig. 2. Wrong Way.

from a distance, and the appearance is gross in the extreme. Annuals and bedding plants should be 6–12 ins. apart at least, unless they are very small. Actual planting is done, as we said above, with a trowel (never with a dibber), the little plants being put into holes of just the correct depth and made very firm. Planting should not be done during hot sunshine.

Bulbs.—These too are planted with a trowel and never with a dibber. Bulbs can be set twice, thrice, or even four times their own depth in soil. As a rule bulb planting should be done in October, the earlier the better, and completed early in November. Great care is needed to see that the holes are flat at the bottom, since otherwise the bulbs may be hung, as is done if planting with a dibber is attempted. Make the soil firm. See our article on *BULB PLANTING*.

Cabbages and Vegetable Plants.—As a rule these should be planted with a trowel and not with a dibber. The best period is a very showery day. Holes, or, in the case of brassicas, nicks, are made, the plants slipped in so that they are buried slightly deeper than before, and they are then made very firm. Planting in drills is advisable in the case of Cabbages and other similar crops; planting in richly manured trenches is advisable in the case of Celery, Leeks, etc.—in both cases to allow for earthing up. Planting on the surface is necessary in the case of Onion plants. See also the notes on SHALLOTS in this article.

Fruit Trees.—These require careful planting. The soil is, of course, first trenched, and holes are taken out with the spade about 4 ft. square and 3 ft. deep. These holes are best dug some time in advance to save delay at planting time. The holes should be at least 9 ft. apart each way, and 12 ft. is better. The bottom of the holes is well loosened and a layer of good soil put in. The tree is then lifted into the hole (it must only be planted very slightly deeper than originally), and while one person holds the tree in an upright position the other fills in the hole and treads the tree very firm. On no account should a mulch of manure be put over the roots, round the stem, or anywhere near the trees, unless planting is not done at its proper time, November to February.

Perennials.—These are planted also with the spade. Holes are taken out which are amply large enough for the clumps, but not so deep that the crowns on the clump will be covered. The clumps are put in and the soil around them is made very firm. They may have to be firmed again after frost. Planting should be done from October to March. The distance apart varies according to the size and nature of the plants, from 9 ins. to 2½ ft. Planting of perennials is also referred to in the articles on *HERBACEOUS BORDERS*.

Potato Planting.—The wrong way of doing this is shown at Fig. 3 and the correct way at Fig. 4. In the former diagram a dibber has been used and a great cavity left under the tuber. In the latter case, Fig. 4, the trowel has been the tool used, and the base of the potato rests on a level bottom. Potato planting is done from March to May, but, personally, we think March is too soon, for it often involves great risk of losing

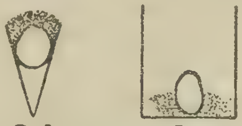


Fig.3. Fig.4
Wrong and Right Way of Planting Potatoes.

the plants owing to frost. Potatoes are best planted 4–6 ins. deep in rows 18–36 ins. apart, the sets themselves being left 12–18 ins. asunder.

Roses.—The planting of these is dealt with in the article on *Rose Planting.*

Shallots.—These and onion sets require somewhat curious planting. The beds are prepared and the surface of these is beaten firm. Then the bulbs are put in so that they are only half buried, the distance apart being about 10 ins. each way from bulb to bulb. This planting is done in February or March.

Shrubs.—The sites for these are first of all thoroughly well prepared, and then, in the case of shrubs of good size, holes are dug about 2 ft. square and 2 ft. deep. The soil below is well broken up and thoroughly loosened. Then a layer of manure or peat is put into the bottom of the hole and covered with soil. After this, the shrub is put in with a big ball of its old soil on its roots if possible, as is shown at Fig. 5. The soil is then filled in round it and made very firm. No mulch should be given it until the following spring, if, as is advisable, planting is done in November. Tall shrubs and fruit trees ought to have stakes supplied to them not after, but during, the operation of planting, since the stakes can be set better then. If stakes are not supplied the trees will be badly blown about.

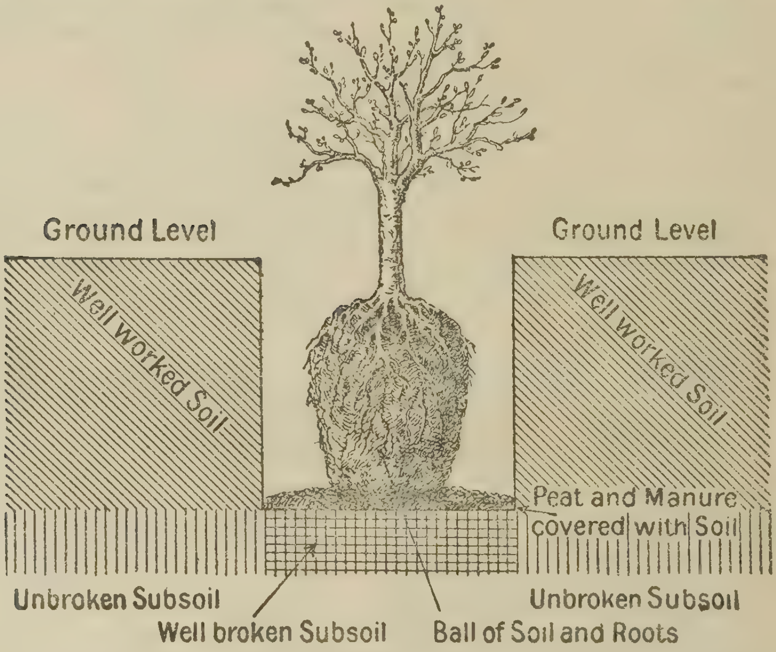

Ground Level
Ground Level
Well worked Soil
Well worked Soil
Peat and Manure covered with Soil
Unbroken Subsoil
Unbroken Subsoil
Well broken Subsoil
Ball of Soil and Roots

Fig. 5.

Trees.—We now come to the last of our planting subjects, namely, the planting of small and great forest trees. The latter point we do not propose to deal with, since it is beyond the skill of the ordinary gardener; and when it is required, which is but very seldom, competent foresters should be employed. The planting of smaller types or specimens of trees is quite a simple matter. They should, if possible, have been re-planted several times in a nursery before being purchased, as this ensures them possessing a quantity of fibrous roots. Very large holes are dug out (sometimes they have to be nearly 5 ft. square, and may be anything from 3–5 ft. deep). Some good soil is put down in the bottom and then the tree put in the centre, securely staked and upright. It is necessary to get someone to hold the tree in position while you fill the soil in. This should be trodden down very well. Trees should not be mulched until the following spring.

Firm Planting.—This concludes our very brief survey of the subject of planting. Many other points might be dealt with, and some omitted from these notes are mentioned by contributors in the course of other articles. One point, however, would we reiterate, and that is the necessity of firm planting. More plants fail on account of loose, "flimsy" planting than through any other cause, so firm planting is one of the great golden rules of gardening.—E.

PLANTING BULBS.—See *BULB PLANTING.*

PLANTING CLIMBERS.—See *CLIMBING AND TRAILING PLANTS.*

PLANTING DISTANCES FOR FRUIT TREES.—See *FRUIT CULTURE, HARDY: GENERAL CONSIDERATIONS.*

PLANTING IN DRY WEATHER.—See DRY WEATHER PLANTING in *BEDDING OUT.*

PLANTING FRUIT TREES.—See *FRUIT CULTURE, HARDY: GENERAL CONSIDERATIONS.*

PLANTING GLADIOLI.—See *GLADIOLUS: CULTURE OF.*

PLANTING HERBACEOUS BORDERS. See *HERBACEOUS BORDERS: MAKING NEW.*

PLANTING: MISTAKES IN.—See MISTAKES IN PLANTING in *BEDDING OUT.*

PLANTING ORCHARDS.—See *ORCHARDS: MAKING AND MANAGEMENT OF.*

PLANTING OUT VEGETABLES.—See under GENERAL MANAGEMENT in *VEGETABLES: GENERAL CONSIDERATIONS.*

PLANTING POTATOES.—See *POTATO.*

PLANTING ROSES.—See *ROSE PLANTING.*

PLANTING VIOLETS.—See *VIOLETS.*

PLANTS: Packing.—See *PACKING FLOWERS AND PLANTS.*

PLANTS REQUIRED FOR DIFFERENT AREAS.—See under VOLUMES in *ARITHMETIC AND GARDENING.*

PLANTS: TRAINING OF.—See *TRAINING OF PLANTS.*

PLANTS or TREES: LAW AS TO REMOVAL.—See *GARDENING LAW.*

PLASTER FOR BACKING.—See *MORTAR.*

PLATANTHERA.—Now included in the genus HABENARIA.

PLATANUS.—For the best species see *TREES.*

PLATYCERIUM.—For the best species see *FERNS AND FERN GARDENING.*

PLATYCLINUS.—See *ORCHIDS.*

PLATYCODON (CHINESE BELLFLOWER. Nat. Ord. Campanulaceæ).—Campanula-like plants of erect habit. Only one species is usually grown. This thrives in deep well-drained soil, and is propagated by division in spring, also by seeds in spring. It is a perennial with a tuberous root.

P. grandiflorum.—This produces tufts of erect stems with glaucous leaves. Flowers rich blue, very large. Site open. Soil deep loam. Flowering Period, July to August. Height, 2 ft. The varieties *album* and *Mariesii* produce white and blue flowers respectively. The last is of dwarf habit, growing 12 ins. high.

[It should be borne in mind that Platycodons are almost as much border plants as rock plants, and should be more extensively grown in the borders than they are. For this latter purpose well-known double varieties such as *album plenum* (double white) and *plenum* (double blue) are the most showy. These are not suitable for the rock garden, as no one likes large double flowers there.—EDITOR.]

PLATYLANA.—Now included in the genus PELLÆA, for which see *FERNS AND FERN GARDENING.*

PLATYPAREA.—See ASPARAGUS FLY in *INSECT PESTS.*

PLATYSTEMON.—See *CALIFORNIAN POPPY.*

PLEASURE GROUNDS: Making and Management of.—The Pleasure Ground, as its name denotes, is that part of the Garden Department which has for its sole object the purpose of giving pleasure to its owner and his friends; therefore it is highly important that when making new or altering existing ones, the taste of the owners should be the first consideration, consistent with the ethics of Landscape Art.

In large establishments the usual procedure is to engage the Landscape Expert, and in such cases it will be seen that the larger the mansion, the larger the expanse of lawns, larger groups of trees and shrubs, etc.; in fact, the whole is proportionate to the size of the building. In some of the smaller establishments, the gardener is his own landscape artist, and it is well to bear in mind that anything that is disproportionate is wrong, and is not easily remedied, entailing an anxious time for the gardener in the future.

Having decided upon the extent of lawns, and the position of groups of trees and shrubs, the question arises: What trees and shrubs to plant to give the best effect?

Some Trees and Shrubs.—Only trees and shrubs of a known hardy constitution should be planted, and when given a bleak place should be protected from cold winds with spruce boughs or other suitable material. Cold winds are responsible for more deaths and sickly specimens than hard frosts, but the two combined are often fatal to newly planted trees and shrubs. Evergreens are great sufferers owing to their foliage giving a greater area for the wind to play upon, whereas with deciduous plants a certain percentage of wind passes through without injuring them.

In planting any of the Coniferæ choose a site where cold winds are broken up by a belt of trees or buildings. Among the most suitable of the Evergreens are Cedars, especially the beautiful *Cedrus atlantica glauca, Abies concolor*, and *Abies pungens glauca.* These trees never fail to find admirers —their silvery tint being very conspicuous.

The genus *Pinus* furnishes us with some very beautiful trees, some of which are indispensable—being of good growth, hardy, and stately Other Evergreens worthy of a place are found among the *Rhododendrons, Osmanthus, Phillyraeas, Berberis*, Box (*Buxus*), Tree Ivies (*Hedera arborea*), *Retinosporas*, etc.

Although many of the Evergreens give very inconspicuous flowers, there is a great wealth of flowering plants to be found in the deciduous section. Their winter bareness is fully compensated for by their extreme beauty in the spring and summer; in fact, there are none so floriferous as these. What rivals have the *Magnolias, Forsythias, Spiraeas, Deutzias, Philadelphus*, Lilacs (*Syringa*), *Viburnums, Spartium, Azaleas, Ribes, Daphnes, Weigelas, Mespilus*, Cherries (*Prunus*), *Pyrus*, Almonds (*Amygdalus communis*), *Paulownias*, etc.?

Pergolas and Wall Plants.—The furnishing of Pergolas requires a considerable amount of judgment and care, and when judicially done is a pleasure to behold. It is desirable to select only known strong growers for this work, as the Pergola is somewhat different from the face of a wall, since it gets the wind from all quarters, hence the necessity for strong growers, and that they are securely tied. Most of the climbing Roses are suitable, also *Aristolochia Sipho, Azara microphylla, Ceanothus veitchianus, Ceanothus Gloire de Versailles, Clematis, Forsythias, Jasminum, Polygonum baldschuanicum, Vitis Coignetiae, V. Thomsonii, V. Thunbergii, Wistaria*, and the beautiful *Actinidia chinensis.* The last named is a very striking plant and a particularly strong grower—often growing 10 ft. during the first season—but is somewhat susceptible to injury by spring frosts, as are the Clematis and Vitis. All three should as far as possible be planted on the most sheltered part of the Pergola.

A very common error with the pruning of plants on Pergolas is the production of a stiff close-pruned appearance. We much prefer to see the Clematis hanging in graceful festoons, and the Roses rising above the Pergola to give a more natural appearance. The case is different with wall-grown plants; these must necessarily be somewhat stiff, but even there it can be modified.

Planting.—This operation is of such importance that only the careful and experienced person who knows the requirements of the subject he is dealing with should be entrusted with the work. In opening the ground to receive its new occupant, the opening should not be less than 2 ft. wider than the radius of the roots when fully laid out, the subsoil loosened to a depth of 1 ft. and fresh compost added. The tree or shrub may then be planted, and if necessary secured to a firm stake — somewhat loosely at first to allow for a sinkage of the whole—and when finally settled the tree should be secured firmly.

Sometimes it is desirable to move a large tree, and when such is the case we prefer to prepare the tree for removal by cutting down and severing the roots on one half of the tree one year and the remaining half the next year. This operation ensures successful removal, and the tree grows away much more satisfactorily.

Evergreen Shrubs and Trees dislike winter planting, and therefore it is desirable to plant either in October or April, and with a ball of soil attached successful removal is practically assured. Deciduous trees are somewhat easier of management, but transplanting in the autumn is to be recommended, as the ground is warmer and root action takes place at once. During a hot, dry summer an occasional watering given to newly planted trees is of immense value. This should not be a mere surface watering, but a thorough soaking—one that will reach every root fibre.

Pruning of Shrubs.—This work calls for experience and thought. Some subjects require pruning immediately after flowering, examples of which are Rambler Roses, *Forsythias*, *Spiraeas*, *Jasminum nudiflorum*, and others, while such as *Ilex*, *Berberis*, *Amelanchier*, *Magnolia*, *Robinia*, *Cerasus*, *Chimonanthus*, and others only require such pruning as will preserve a well-balanced plant.

Flower Beds, Borders, Drives, Lawns, etc.—A trim and neat appearance of the Flower Beds, Borders, Walks, and Drives is always pleasing to the eye, and therefore it is essential that the edges of turf should be nicely and truly cut during the winter, and always cut in such a manner that the lower portion of the cut is inclined to the road or path. This gives solidity to the edges to better withstand the weight of mowing machines and rollers. Re-cut all Flower Beds and Borders in the same manner as the roads, and make a special point of seeing that all curves and lines are true.

Roads and Drives are better for being put in order during the winter, as the material binds better, and when done then does not interfere with spring and summer work. This is also the time for re-turfing any worn or bare places in the Tennis Courts, Bowling Greens, Lawns, Cricket Grounds, etc.

As the days lengthen the lawns will require attention in the matter of weeding and feeding. Remove all plantains and daisies; the former is the worst weed of all, for when removed it leaves an ugly bare patch. This can be remedied by loosening the soil and sowing grass seeds. Daisies are not so difficult if feeding is resorted to, as the stronger grass overgrows the daisies and suffocates them. Soot is invaluable to impart a beautiful green colour to the lawns, and has the advantage of being lasting. Many of the advertised lawn manures are useful, being scientifically prepared. They supply the exact food required. Rolling and sweeping prepares the way for the mowing machine, which is soon required.

Colour Harmony.—There is nothing in the flower garden so distasteful as a poor arrangement of colours; no matter how well the plants are grown, if the colour harmony or contrast is not well studied and carried out, the whole may be considered a failure.

Bold masses of a decided colour are preferable to mixtures, but where two or three colours are desired, aim at harmony. For guidance I will quote colours that harmonise with each other: Orange and Blue, Yellow and Crimson, Yellow and Brown, Pink and Grey, Yellow and Purple, Pale Blue with light Orange, Scarlet and Green. White is good with any colour. Care should be taken not to use too much yellow, as this is a very telling colour and may easily be overdone. See also articles on *Colour Gardening.*

Staking, Thinning, and Tying.—What is there so ugly as a number of growths of plants tied up in "Birch Broom" fashion? Nature has taught us many lessons of how a plant should be, and one is to tie it in the position it was when about to fall out of place. Incline the stakes outwardly at a slight angle and put the stake in such a position that little or none of the stake can be seen. Some plants need no staking, being procumbent or semi-procumbent; leave these severely alone. Copy Nature as much as possible, consistent with needed support. See also *Stakes and Staking.*

Bedding and Border Plants.—There is a great diversity of colour and form among these plants, and it is not always necessary to employ much fire-heat to raise and grow them. Of late years the *Antirrhinums* have made such brilliant displays that it would be difficult to find any class of plant to surpass them in colour or ease of management. They seldom come true from seeds, therefore cuttings have to be resorted to; cuttings of any particular colour that it is intended to grow should be inserted in the ordinary way. The best varieties are: *Orange King*, 1½ ft. high; *Fire King*, 1½ ft.; *Golden Prince*, 2 ft.; *Nelrose*, pink, 2 ft.; *White Queen* 2–3 ft.; *Rosy Morn*, 2 ft.; and *Crimson King*, 2–3 ft. All these varieties will flower continuously from May to November provided all seed vessels are picked off as soon as formed.

Stocks are indispensable; their fragrance, long range of colour, ease of management, and general effectiveness mark them as among the finest of bedding or border plants that we have. Raised from seeds in boxes or frames and pricked out about 4 ins. apart at the end of April, they make sturdy plants to put into their permanent quarters, where they will flower onwards to November. Like the Antirrhinums, they dislike too much fire-heat—in fact, the less the better.

Numerous other plants require similar treatment, examples of which are: *Cheiranthus Allionii*, *Dimorphotheca aurantiaca*, *Gaillardias*, Larkspurs (*Delphinium Ajacis*), *Nemesia Suttoni*, *Phlox Drummondii* and its varieties, and a host of other plants, but such as Tagetes, Lobelias, Asters, Cosmos, *Dianthus Heddewigii* Heliotropium, French and African Marigolds, Mimulus, Petunias, Pyrethrums, and Zinnias should be given a certain amount of heat to rear them in time to give a display, as described in the Half-Hardy Section of the article *Annuals for all Purposes.* See also article on *Bedding Out.*

Herbaceous Borders.—It is sometimes thought that these borders are places where plants may be put out to do their best with little attention. This idea is wrong. A well-arranged border needs a good deal of attention during the spring and early summer months, and well repays any care bestowed upon it. As, however, these borders have two special articles devoted to them, we refrain from giving subject details here.—J. W. M.

PLECTOCEPHALUS.—Now included in the genus *Centaurea.*

PLEIONE.—See *Orchids.*

PLEOCNEMIA.—Now included in the genus Nephrodium, for which see *Ferns and Fern Gardening.*

PLEOPELTIS and PLEURIDIUM.—Now included in the genus Polypodium, for which see *Ferns and Fern Gardening.*

PLEUROTHALLIS.—See *Orchids.*

PLOUGHMAN'S SPIKENARD (*Inula Conyza.*)—A wild plant of no garden value.

PLUM.—See *Plum: Culture of*, and under Prunus in article on *Trees.*

PLUM APHIS.—See *Insect Pests.*

PLUM (*Prunus.* Nat. Ord. Rosaceæ):

Culture of.—The culture of the plum is very similar to that of the apple, and this fruit may be successfully grown by carrying out the instructions in the general article on *Fruit Culture, Hardy.* Ordinary garden loam is all that is needed, since a rich soil means too much growth. Also extremes in soils do not suit it, for its roots will be chilled and starved in a strong clay soil and will wander about hungrily and get very dry in summer if planted in a poor loose sandy medium. Suckers must be removed at an early stage; and young trees must not be allowed to be overburdened with fruit during the second or third year. Plums are propagated by grafting or budding. The principal stock used is the *Mussel*, but others, such as the *Myrobalan Plum*, the *St Julien*, and the *Brompton Plum*, also find favour. Root pruning, when carefully carried out in October, often results in a largely increased crop where trees were formerly inclined to "run to wood." On soils naturally deficient in calcareous matter a dressing of either ground chalk or quicklime should be applied every second season at the rate of 4–6 oz. per sq. yard; this will not be necessary where the soil rests on a limestone or chalk substratum.

PLUMS FOR DESSERT.

Of the four specially described below it is hard to say which is the best. The following is their order of ripening:—*Oullin's Golden Gage*, *Denniston's Superb Gage*, *Jefferson's Gage*, and *Late Transparent Gage*.

Denniston's Gage.—Small, yellow, often with red flush. Copious bearer, and good in any form. Delicious flavour.

Jefferson's Gage. — Large oval, yellow speckled and flushed with red. Growth compact, excellent in any form. Very delicious flavour.

Late Transparent Gage.—Small greenish yellow. Free bearer. Very rich flavour.

Oullin's Golden Gage.—Large clear canary yellow. Very rich and juicy. Free grower, and good in any form.

Other Sorts.—The following choice Dessert Plums are also of outstanding merit:—*Belgian Purple*, *Bryanston's Late Gage*, *Coe's Golden Dish Gage*, *Comte d'Althan's Gage*, *Golden Esperen*, *Kirke's Blue*, *Old Green Gage*.

PLUMS FOR COOKING.

Many of these when fully ripe rank for dessert use, especially when grown on a wall. Likewise Desserts are sweetmeats cooked.

Belle de Louvain.—Very large, egg-shaped. Colour deep purple. A grand thoroughly reliable variety succeeding in any form. Growth upright, and makes a fine tree. Rich acid flavour.

Late Orange.—Medium size, rich colour. A useful variety of free growth. Moderate bearer.

Pond's Seedling.— Very large, pink. A fine late variety. Makes a large tree and bears well.

President. — Large oval. Deep purple colour. Compact grower and good bearer. Rich flavour. A late variety.

River's Early Prolific.— Small oval. Deep purple colour. Ripens at the end of July. One of the richest for bottling or preserving. Makes a small weeping standard. Moderate bearer.

Victoria (*Alderton* or *Dampshine*). —Large pink. The well-known maincrop plum. Makes a small tree, and is good in any form.

Other Sorts.—The following Cooking Plums are also first class:—*Autumn Compôte*, *Cox's Emperor*, the *Giant Prune*, *Monarch*, *River's Czar*, *The Sultan*, and *White Magnum Bonum*.

The bottling of plums and other fruits is described in our article on *Fruit Bottling*.—G. B.

PLUM RED GRUB.—See *Insect Pests*.

PLUM RUST. — See *Diseases of Plants*.

PLUM WEEVIL.—See under Otiorhynchus Weevils in *Insect Pests*.

PLUMBAGO (LEADWORT. Nat. Ord. Plumbaginaceæ).—This is one of the best and most useful free flowering plants grown for the greenhouse or conservatory, and for planting out of doors in the summer in mixed beds with other flowering and foliage plants. It is of easy culture, thriving in light sandy loam with one-third of fibre peat, and can be used as a pot plant, or climber to grow up pillars and rafters with good effect. Cuttings of side-shoots, or half-ripened young wood root freely in summer under a frame or hand-light, with little bottom heat. Temperature required from 50° F.

Greenhouse Species:—*Plumbago capensis.*—Pale blue. Flowers from June to October. Height, 2–10 ft.

P. capensis alba.—The white form. Flowers from June to October. Height, 2–10 ft.

P. Larpentae.—A hardy perennial rock plant. See *Ceratostigma plumbaginoides* in article on *CERATOSTIGMA.*

PLUME GRASS (*Pennisetum longistylum*).—See *ORNAMENTAL GRASSES* and *PENNISETUM.*

PLUME POPPY (*Bocconia.* Nat. Ord. Papaveraceæ).—Two kinds of Plume Poppies are commonly grown as hardy herbaceous perennials. These, *B. cordata* (Syn. *B. japonica*) and *B. microcarpa*, bear cream and bronzy flowers respectively from June onwards, and both have attractive foliage. The former averages 4–7 ft. in height, while the latter may reach a height of 9 ft. Light rich soil suits them, and propagation by root division in the early spring is not a matter of any difficulty. Their height and general character makes them suitable for shrub borders or for the back rows of hardy perennial parterres.

PLUTELLA.—See DIAMOND BACK MOTH in *INSECT PESTS.*

PNEUMONANTHE.—Now included in the genus *GENTIANA.*

POA (MEADOW GRASS. Nat. Ord. Gramineæ).—This is a large genus of hardy annual and perennial grasses. *P. abyssinica* is popularly known as TEFF. *P. annua* is the troublesome ANNUAL MEADOW GRASS, described with methods of control in our article on *WEEDS*, which is also known by the name of CAUSEWAY GRASS. *P. compressa* is known as the BLUE MEADOW GRASS, and is really a weed, though grown sometimes in the wild garden, while *P. nemoralis* and *P. trivialis* are useful lawn grasses, the former more especially for shady lawns and the latter for lawns in coast towns. (See article on *LAWNS AND THEIR MANAGEMENT.*)

POCOCKIA.—Now included in the genus *TRIGONELLA.*

PODOCARPUS.—For the best species see *TREES.*

PODOPHYLLUM (DUCK FOOT. Nat. Ord. Berberidaceæ).—Only three species of this are of much garden value. These, *P. Emodi* (Syn. *P. hexandrum*), popularly known as the HIMALAYA MAY APPLE, *P. peltatum* (Syn. *P. montanum*), the MAY APPLE, and *P. pleianthum*, are all hardy herbaceous perennials requiring a fairly moist soil, though they will grow, it is true, in dry borders or on rockwork. They bear white and purple flowers respectively from May onwards, and average ½–3 ft. in height. Propagation is best effected by root division in the spring, which is also the best planting period.

PODOSPERMUM.—Now included in the genus SCORZONERA. See *VIPER'S GRASS.*

POET'S DAFFODIL (*Narcissus Poeticus*).—See *NARCISSUS SPECIES.*

POET'S NARCISSUS.—The same as POET'S DAFFODIL.

POETICUS DAFFODILS. — See *DAFFODILS.*

POETRY.—See *GARDEN POETRY.*

POISON IVY (*Rhus Toxicodendron*) and **POISON OAK** (*Rhus Toxicodendron*). See *SHRUBS.*

POISON SUMACH (*Rhus venenata*).—See *SHRUBS.*

POISONOUS PLANTS.

A knowledge, even if it be only of a superficial character, of vegetation which is known to be more or less poisonous to human beings and to animals, is of very great importance to all gardeners. It is true that to be able to identify the majority of them the trained eye and skill of the botanist is necessary; but there are very many plants grown in gardens for their beauty that may be recognised without great difficulty; and while these may not be likely to be consumed in mistake by adults, there is always the risk of children or animals partaking of them with dire results.

Let us take, first of all, one or two crops grown for food, as examples which are particularly poisonous. Sorrel (*Rumex Acetosa*), which is sometimes used for salads, may not affect adults unless eaten to excess, but it often proves injurious to children because of the oxalic acid it contains. Rhubarb, again, is a perfectly safe vegetable to eat if its leaf stalks only be consumed, but if the leaves be cooked and eaten similarly to spinach, they are decidedly poisonous, as has been proved by comparatively recent cases. Here, also, the poisonous element is oxalic acid. Potatoes that have been long exposed to the light, and assumed a deep green colour in their skins, are also unsafe to eat because of the presence of a poison technically known as solanine.

Of fruits mention may be made of the kernels of the peach and nectarine and its ally, the Bitter Almond (*Prunus Amygdalus amara*), all of which contain prussic acid and are decidedly poisonous if eaten. Even the leaves of the Sweet Almond (*Prunus Amygdalus dulcis*) contain the same poisonous substance. Cases are recorded of children being poisoned by eating the kernels of cherry stones, so that it is well to warn young folk against doing so.

Many kinds of seeds of cultivated and wild plants are also poisonous. Those of the Laburnum (*Laburnum vulgare*) are especially so, and with these may be mentioned those of the Mulleins (*Verbascums*); the Corn Cockle of our cornfields (*Lychnis Githago*); the Spindle Tree (*Euonymus europaeus*); and of the Thorn Apple (*Datura Stramonium*). The seeds of the Monkshood (*Aconitum Napellus*) are also deadly poisonous, and so are those of its relatives, the Perennial and Annual Larkspurs (*Delphinium*). Seeds of the Castor Oil Plant (*Ricinus communis*) are poisonous to both man and beast.

Irritant poisons also exist in the foliage of such trees, shrubs, and plants as the Savin Juniper (*Juniperus Sabina*); Meadow Saffron (*Colchicum autumnale*); Hellebores (*Helleborus*); Yew (*Taxus baccata*); Arbor Vitae (*Thuyas*); the Common Laurel (*Prunus Laurocerasus*); *Andromeda polifolia*, and *Kalmia latifoila*. These are all highly dangerous to sheep or cattle partaking of them. Rhododendron foliage has also been known to poison live stock partaking of it. Nearly all the species of Ranunculus are poisonous to animals. Other species of wild flora which are poisonous to both man and beast are the Hemlock (*Conium maculatum*); Cowbane or Water Hemlock (*Cicuta virosa*); Water Dropwort (*Œnanthe crocata*); Fool's

Parsley (*Æthusa Cynapium*), a plant with parsley-like foliage and liable to be easily mistaken for the latter by inexperienced persons (a deadly poison); the Bitter-sweet or Woody Nightshade (*Solanum Dulcamara*); Dog's Mercury (*Mercurialis perennis*); Caper Spurge (*Euphorbia Lathyrus*); and the Box Tree (*Buxus sempervirens*).

The roots, bulbs, or tubers of many cultivated and wild flowers are known to be more or less poisonous to man and animals. Thus the roots of the various species of Monkshood or Aconite (*Aconitum*) grown in gardens have occasionally been mistaken for those of the horseradish or even for the tubers of the artichoke, with fatal results. Bulbs of the Daffodil or Narcissus; the Guernsey Lilies (*Nerines*); the Snowdrop (*Galanthus nivalis*); the Bluebell of our woods (*Scilla nonscripta*); and the Meadow Saffron (*Colchicum autumnale*) and its kindred species, are all of a poisonous nature, the Colchicums especially so. The corms of the Cuckoo-pint (*Arum maculatum*) are poisonous eaten in a raw state, but harmless when boiled. The roots of the Bryony of our hedgerows (*Bryonia dioica*) are also very poisonous. The fleshy roots of the Cowbane (*Cicuta virosa*), and of the Water Dropwort (*Œnanthe crocata*), have been known to poison animals who have partaken of them. The roots of the former have been mistaken for those of the Parsnip, also the leaves for those of the Celery, by human beings, with fatal consequences. Cases have occurred in recent years of animals being poisoned by eating the roots of the Runner Bean (*Phaseolus vulgaris*) that were carelessly thrown on a rubbish heap to which the animals had access. No doubt there are many more roots and bulbs that are unsafe for animals or human beings to eat.

Coming to berried fruits, those of the Yew (*Taxus baccata*) are more or less poisonous to children who have eaten them. The purple berries of the Privet (*Ligustrum vulgare*) have been known to poison children. The red berries of the Bryony (*Bryonia dioica*), so plentiful on hedges in late summer, are also exceedingly poisonous, fifteen of them being calculated enough to kill a child. The black berries of the Deadly Nightshade (*Atropa Belladonna*) are a deadly poison. So are the red berries of the Bitter-sweet (*Solanum Dulcamara*). Not less harmful are those of the Black Nightshade (*Solanum nigrum*). The so-called Wonderberry, a Yankee production, which was widely advertised a few years ago as an edible-berried plant, is unquestionably a variety of the latter, and hence should not be grown. The Caper Spurge (*Euphorbia Lathyrus*) produces seed-pods like those of the true Caper (*Capparis spinosa*), but as they are undoubtedly poisonous they should be avoided. Nor should children be permitted to eat the red berries of the Cuckoo-pint (*Arum maculatum*), or of the Mezereon (*Daphne Mezereum*), the well-known winter-flowering shrub.

Among other plants of a poisonous character, which have proved harmful to many persons by producing a kind of eczema or irritation of the skin, is the popular greenhouse plant called *Primula obconica*. The leaves and stems of this plant are furnished with hairs which are liable to penetrate the skin of the hands and arms when the plants are handled, and apparently discharge an irritant poison. In handling this primula, therefore, the gardener should wear gloves as a protection. Yet another plant which has been extensively planted as a wall-climber under the name of *Ampelopsis Hoggii* possesses similar baneful properties. The correct name of this climber is *Rhus Toxicodendron,* commonly known as the Poison Ivy. Many people have been seriously injured by handling its leaves. Such a dangerous plant should be banished from our gardens. Some people have also suffered badly from blood poisoning through allowing the acrid milky juice which exudes from the cut shoots of *Euphorbia fulgens, splendens,* and *pulcherrima* to come in contact with open wounds on their hand when preparing cuttings. Even the hothouse species of *Allamandas* possess a similar property. In addition to these there are many fungi which are utterly poisonous to eat, and in some cases very dangerous to touch. These, however, are dealt with in the article on *FUNGI: EDIBLE AND HARMFUL.*

Our list of plants that are poisonous to a smaller or greater extent does not by any means profess to be a complete one. It, however, contains those of the greatest importance which it is necessary for gardeners to make themselves acquainted with in order to avoid the possibility of serious illness or death following their consumption as food, or coming in contact with their bodies. Nor shall we attempt to give possible remedies here. In all cases it will be wise to secure medical assistance as promptly as possible in the event of illness occurring in connection therewith.—T. W. S.

POKEBURR (*Phytolacca decandra*) and **POKEWEED.**—See *PHYTOLACCA.*

POLEMONIUM (GREEK VALERIAN and JACOB'S LADDER. Nat. Ord. Polemoniaceæ).—This is indeed a most desirable hardy herbaceous perennial. We have watched it growing for years in town gardens, and it thrives there quite as well as in our own garden, which may be said to be out of the town range. It is first class for cutting, though it is not everyone that is fond of its somewhat peculiar scent. It may be used alike in the herbaceous perennial border and in a sunny shrub border, or even in an open wild garden and rock garden.

Culture.—Undoubtedly this is a plant for the beginner or amateur gardener, for it succeeds admirably in any ordinary garden soil in a sunny position. Being one of the Phlox family, it is fond of plenty of water in very hot, dry weather. Planting may be done any time from late October to early April, and division of the roots may be carried out at the same period. The plant may be increased from seeds sown in the usual way for perennials, though division of the roots is obviously the quicker and more satisfactory way of increasing the stock. It is desirable that the dead flower spikes should be freely cut off if a second and autumnal supply of bloom is desired. We do not find it needs staking.

What to Grow.—We cordially recommend the following as desirable, easily grown species and varieties for the perennial border:—

Polemonium caeruleum. — Undoubtedly this is the most popular sort of all, and is deservedly the most widely grown. Its blue flowers are produced from June to August, and it averages 18 ins. in height. Some of the best sorts of this include *P. c. album,* a white-flowered sort; *P. c. dissectum,* similar; *P. c. pilferum,* a desirable blue; *P. c. Richardsoni,* of some nurserymen also blue, though what is most often popularly known as *P. c. Richardsoni* is really a variety of *P. humile* below; *P. c. variegatum*, blue; and *P. c. villosum*, a desirable sky-blue.

P. flavum.—A pale yellow June and July flowering sort, growing up to 1 yd. in height, but seldom seen in ordinary garden borders.

P. gracile.—A blue early flowering sort opening its first blooms in early June. It averages about 18 ins. in height.

P. humile.—Nurserymen are responsible for confusing this species with others. By some it is known as *Polemonium Richardsoni*, which is, as noticed below, a variety of *Polemonium caeruleum*; by others it is known as *Polemonium moschatum*, though this is not really a species. It is a very dwarf blue midsummer or July flowering sort, growing not more than 6 ins. high.

P. mexicanum.—A blue spring (April) flowering sort about 1 ft. high.

P. moschatum.—A synonym, nursery name, or variety of *Polemonium humile*, which see.

P. pauciflorum.—This reddish-yellow summer blooming sort, which grows about 18 ins. high, is not specially desirable, though the colour is unusual.

P. reptans.—Useful in the rock garden. (See below.)

P. Richardsoni.—This popular sort of the nurserymen is considered by the Kew authorities to be a variety of *Polemonium humile* (which see), though a form of *P. caeruleum* is frequently sold for it.

P. sibiricum.—This, though offered as a species, is the variety *dissectum* of *Polemonium caeruleum*, which see.

P. villosum.—Often imagined to be a separate species, this sky-blue sort is in reality a variety of *Polemonium caeruleum*, which see.

Rock Garden Species.—These tufted plants are of easy culture, and are propagated by division in autumn or spring.

Polemonium confertum.—This biennial sort produces hoary pinnate leaves in tufts. Flowers deep blue, in clusters. Site, half-shade. Soil gritty, leafy, well drained. Flowering Period, June onwards. Height, 6–12 ins. The variety *melitum* has white flowers.

P. humile.—This (described above) is also suitable for the rock garden.

P. reptans.—This is of spreading habit. Flowers pale slaty-blue. Site, half-shade. Soil sandy loam. Flowering Period, March. Height, 9–12 ins.

POLIANTHES TUBEROSA.—See *TUBEROSE.*

POLISH WHEAT (*Triticum polonicum*).—See *TRITICUM.*

POLIUM.—Now included in the genus *TEUCRIUM.*

POLY GERMANDER (*Teucrium Polium*).—See *TEUCRIUM.*

POLYANTHA ROSES.—See *ROSE CLASSES.*

POLYANTHES DAFFODIL (*Narcissus Tazetta*).—See *NARCISSUS SPECIES.*

POLYANTHES NARCISSUS.—See TAZETTA and TAZETTA HYBRIDS in *DAFFODILS.*

POLYANTHUS (Nat. Ord. Primulaceæ).—Garden variety of *Primula vulgaris.* General description and culture are similar to those given in the article on *AURICULA.* As a florists' flower there are three sections, namely, Fancy, Laced, and Selfs.

Varieties.—The old named varieties are no longer in culture, and the plants are usually sold under the different sections. The *Munstead Strain* is the most famous.—J. L. G.

UP-TO-DATE SELECTIONS.

Polyanthus Barrowby Gem.—Lemon-yellow.

P. New Hybrids.—Orange, scarlet, amber, etc.

P. New Sunset Hybrids.—Orange, amber, etc.

P. Brilliance.—Red and orange.

POLYGALA (MILK-WORT. Nat. Ord. Polygalaceæ).—This is a genus of considerable extent, comprising hardy annuals, stove annuals, half-hardy evergreen shrubs, greenhouse evergreen shrubs, and hardy herbaceous perennial species. We need not trouble here with any but the last section; this, however, includes several species which may be grown in the usual way for hardy perennials in the mixed, shrub, or wild garden borders. Propagation is best effected by seeds sown in the summer or division of the rootstocks in the autumn or spring, at which latter period planting may be most successfully carried out. We recommend the following :—

Polygala calcarea (CHALK MILKWORT).—This bears flowers of varying shades of purple, pink, rose, lilac, and blue. We understand there is a white form too, but have not yet grown it. The plant blooms from May to July, and averages 2–6 ins. in height.

P. Chamaebuxus (BASTARD BOX).—This, and its varieties *purpurea* and *cosea*, bear yellow, purple, and pink flowers respectively from May onwards, and grow about 6 ins. high.

P. comosa.—This bears pretty blue flowers from May to June, and averages 3–6 ins. high.

P. rosea.—This is a pretty species, bearing rose-pink flowers in May and June. It grows 3–6 ins. high.

POLYGONATUM. — See *SOLOMON'S SEAL.*

POLYGONUM (KNOT GRASS. Nat. Ord. Polygonaceæ).—Many plants are more useful than the Knot Grasses, it must be admitted, but without a brief reference to some few of the more attractive pecies this work would not be complete. The genus is a very large one, and contains hardy annuals, greenhouse evergreen shrubs, greenhouse herbaceous perennials, hardy herbaceous climbers, hardy herbaceous trailers, hardy herbaceous border plants, and hardy perennial rock plants. The first three sections are excluded from the present edition as being beyond our scope, while the best climbers and trailers will be found mentioned in our article on *CLIMBING AND TRAILING PLANTS*, although a couple are described under rock garden species below. Left, then, with the perennial border and rock plants, we may point out that the first are plants of extremely easy culture, more suitable for the wild garden or shrub border than for the perennial parterre. Common garden soil and a sunny or lightly shaded spot are alone the essentials to success; and propagation, a matter of extreme ease, may be effected by seeds sown outside from March to July, or by division of the roots from October to March, any time between which months forms a suitable planting period.

Perennial Border Species. — We mention the following as being the most noteworthy of the numerous species :—

Polygonum alpinum.—This and its varieties *polymorphum* and *songaricum* bear white flowers from June to July, and average 18–24 ins. in height.

P. amplexicaule (Syn. *P. petiolatum*).—This and its variety *oxyphyllum* produce red and white flowers respectively from mid-June onwards for six weeks, and average 1½–3 ft. in height.

P. angustifolium.—This nurseryman's species has now been renamed *P. Laxmanni.*

P. aviculare.—This, the COMMON KNOT GRASS, is not worth growing.

See Knot Grass in article on *Weeds.*

P. baldschuanicum.—See article on *Climbing and Trailing Plants.*

P. Bistorta.—This is not worth growing save for medicinal purposes. See Bistort in our article on *Medicinal Herbs.*

P. Convolvulus.—This is a troublesome weed, and not worth growing. See Black Bindweed in article on *Weeds.*

P. cuspidatum (Syn. *P. Sieboldi*).—This plant, on account of its foliage, is specially useful for the wild garden. It bears white flowers from June to September, and grows 6–12 ft. high.

P. divaricatum (Syn. *P. salignum*).—This spreading species bears white flowers from July to August, and grows 1½–3 ft. high.

P. Laxmanni (Syn. *P. angustifolium*).—This is a well-known and useful white June blooming sort, about 12 ins. high.

P. molle.—This is a white sort blooming from June to August, and growing about 1 yd. high. A sort of this name is described by another authority as being synonymous with *P. polystachyum,* which see.

P. multiflorum. See article on *Climbing and Trailing Plants.*

P. petiolatum.—Syn. *P. amplexicaule,* which see.

P. polystachyum. — This is a white sort blooming from July to September, and averaging 1 yd. in height.

P. sachalinense.—This, on account of its very handsome foliage, is specially useful in the wild garden. It bears white flowers from June to September, and grows 4–12 ft. in height.

P. salignum.—Syn. *P. divaricatum,* which see.

P. Sieboldi.—Syn. *P. cuspidatum,* which see.

P. virginianum.—This is a useful white August blooming sort about 1 yd. in height.

Rock Garden Species. — Only three species of this large family are suitable for the rock garden.

Two of these, *P. affine* and *P. vacciniifolium,* are valuable for covering large spaces. All are propagated by division of the roots in autumn or spring.

Polygonum affine (Syn. *P. Brunonis*).—This is a strong-growing creeper. Flowers rosy-pink. Site open. Soil sandy loam. Flowering Period, July to September. Height, 9 ins.

P. sphaerostachyum (Syn. *P. macrophyllum*).—This forms tufts of leathery leaves. Flowers blood-red in drooping spikes. Site shady. Soil boggy. Flowering Period, June. Height, 9 ins.

P. vacciniifolium.—This is a well-known trailing plant. Flowers rosy-pink in spikes. Site open. Soil sandy loam. Flowering Period, July to October. Height, 9 ins.

POLYPODIUM.—For the best species and varieties see *Ferns and Fern Gardening.*

POLYPODY.—The various forms of this are referred to under *Polypodium vulgare* in *Ferns and Fern Gardening.*

POLYPOGON (Beard Grass. Nat. Ord. Gramineæ).—This is a genus of hardy grasses which will grow strongly in most soils, but are hardly worthy of extensive cultivation even in the wild garden. The best species are *P. littoralis, P. maritimus,* and *P. monspeliensis.* These average 12 ins. in height.

POLYPORUS DISEASES. — See *Diseases of Plants.*

POLYSTICHUM.—Now included in the genus Aspidium, which see in *Ferns and Fern Gardening.*

POMEGRANATE (*Punica granatum*). See *Climbing and Trailing Plants.*

POMPON DAHLIAS.—See *DAHLIA: CULTURE OF.*

POMPON ROSES.—See footnote to POLYANTHA ROSES in *ROSE CLASSES.*

POND MUD.

This is a fairly rich manure suitable for light soils mostly, but quite unsuitable for all soils in its fresh state. One of the best ways of treating it is to make a good heap of it, cover with soil to the depth of about 3 ins., and allow the material to mellow down for about a year. It can then usually be cut down into shreds or a rough powder and spread on the land. About 2 cwt. per square rod is usually very ample, and the best time to apply is the late autumn or early winter.

PONDWEED.—See *POTAMOGETON.*

POOR MAN'S WEATHER GLASS (*Anagallis arvensis*). — See *ANAGALLIS* and under SCARLET PIMPERNEL in *WEEDS.*

POPLAR.—For the best species see POPULUS in *TREES.*

POPLAR GALL APHIS.—See under LETTUCE ROOT APHIS in *INSECT PESTS.*

POPPIES (*Papaver.* Nat. Ord. Papaveraceæ).

Annual Species. — Very few of the so-called ANNUAL POPPIES are of strictly annual duration, although their tendency is in this direction after many years of cultivation and selection as such. Notwithstanding the fugitive character of their flowers they are prime garden favourites, while for indoor decoration, when cut in the opening-bud stage, they are charming. In cultivating the sorts named below it should be remembered that with very few exceptions the seeds are sown far too thickly and the seedlings are insufficiently thinned out. The novice may consider it foolish to thin the popular Shirley Poppies until the seedlings are 1 ft. apart, and yet it is only thus that the full beauty of the plants may be obtained. All Poppy seeds are small, and in most cases they are freely produced, the usual result being thick sowing. Annual Poppies dislike transplantation, therefore the seeds should be sown where the plants will remain to flower. Good garden soil gives the best results; in very light, dry, and poor soils Poppies have only a short life. The seeds should be sown in the autumn or early spring, merely covering them with soil, but of course the site should be carefully levelled or the hoe may put an end to their existence ere they are fairly through the soil. After the thinning out above mentioned, a copious watering should be given. We recommend the following species:—

Papaver glaucum (TULIP POPPY).—This has deep red flowers and blooms from June onwards; it is very effective when massed, especially in mixed borders. Its height averages about 18 ins.

P. pavoninum (Syn. *P. corniqerum*).—This, the well-known PEACOCK POPPY, is a handsome, scarlet-flowered species, with a black blotch at the base of each petal. It blooms throughout the summer, and averages 18 ins. in height.

P. Rhoeas (Syns. *P. arvaticum, P. arvense, P. cereale, P. cruciatum, P. rusticum,* and *P. umbrosum*).—This is the common SCARLET POPPY or FIELD POPPY, often so beautiful (but a bad weed) in cornfields. There are numerous strains, but the SHIRLEY POPPIES are probably the most popular, with a range of colouring from palest pink to crimson, and from cream to heliotrope, while the flowering period extends from June to October. The Japanese Pompon strain is 15 ins. high, and has double flowers. Some of the Shirley Poppies are semi-double, and others are double, but not clumsily so. The height of the Shirley Poppies is about 2 ft.

P. somniferum (Syns. *P. album, P. amoenum, P. amplexicaule, P. officinale,* and *P. setigerum*).—This is the OPIUM POPPY famous in China, and a plant that is naturalised in Great Britain. It is extremely variable, and a number of varietal forms have been named, while garden strains are also numerous. The blooms are large; they are set on stout, many-flowered stems above wavy, greyish leafage. Most of the large, very double and fringed forms offered by seedsmen have been evolved from this species, and the colour of the blooms may be white, blush, rose, lilac, violet, red or crimson. The *Carnation, Danebrog, Mephisto, Mikado,* and *Paeony-flowered* strains, as well as *Cardinal* and *White Swan* varieties, have all come from *P. somniferum.* The flowering period of these extends throughout the summer, and the height is 2–4 ft. For the medicinal culture of this plant see OPIUM POPPY in our article on *MEDICINAL HERBS.*

Perennial Border Species.—This section of Poppies is a very extensive one, to which it is difficult to do justice. All the species are of easy culture, thriving under the usual treatment given to hardy herbaceous perennials, but must be well staked, otherwise the taller sorts fall about rather badly, and look distinctly untidy. They prefer moist and rich garden loam containing plenty of sand, and are not difficult to propagate in the autumn or spring by root division, at which times they may be successfully planted. It may be well to remark that they do not love being disturbed, and should certainly not be lifted more than once in three years. A mulch of old hotbed manure will be useful for keeping the roots of most of these species (especially *P. nudicaule* and *P. orientale*) moist in dry weather. This should be put on in mid-June. Of the large numbers of species we recommend the following:—

Papaver aculeatum (Syn. *P. gariepinum*).—This bears bright, almost vermilion, red flowers from June onwards, and averages about 18 ins. high.

P. caucasicum (Syns. *P. floribundum* and *P. fugax*).—This bears attractive red or crimson flowers from June to July, and averages 1½–2½ ft. in height.

P. nudicaule (Syn. *P. radicatum*).—This, the ICELAND POPPY, is, of course, a very well-known garden plant, bearing useful yellow flowers from July onwards on plants 1–2 ft. in height. There are some garden varieties of this, including two or three dwarf forms suitable for rockwork, averaging only 6–12 ins. in height.

P. orientale.—This species includes the well-known ORIENTAL POPPIES, of which there are such hosts of garden varieties at the present time. The colours are mostly reds, while the flowering period extends from May to June, and the height averages 2½–4½ ft. Space taken up here in describing the best sorts would be wasted, as new improved sorts are constantly being put on the market. Readers should thus consult current trade catalogues.

P. radicatum.—Syn. *P. nudicaule,* which see.

Rock Garden Species.—Only a few species of Poppies are suitable for the rock garden, of which the two given below are quite the best. Both succeed under ordinary rock garden or rock border culture in well-drained loam, and are best propagated by seeds sown very thinly in the autumn.

Papaver alpinum (Syns. *P. Burseri* and *P. pyrenaicum*).—This, popularly known as the ALPINE POPPY, an annual or biennial, has much divided greyish foliage in tufts. Flowers vary from white to orange and pink. Site open. Soil very gritty. Flowering Period, July. Height, 3 ins.

P. nudicaule.—The dwarfer forms of this, as mentioned in the last section, may be used in the rock garden with considerable success.

UP-TO-DATE SELECTIONS.

Papaver nudicaule Coonara Pink.—Pink, rose, salmon, etc.

P. n. Paradise Hybrids.—Many colours.

P. n. Commonwealth. — Great range of colours.

P. n. Large-Flowered. — Many colours.

P. n. Tangerine.—Orange.

P. orientale flore pleno Olympia.—Orange-scarlet.

P. o. Claret.—Claret.

P. o. Hybrids.—Many colours.

P. Rhoeas Ryburgh Hybrids.—Many colours.

POPPY ANEMONE (*Anemone coronaria*).—See *ANEMONE.*

POPPY MALLOW (*Callirhoë.* Nat. Ord. Malvaceæ).—The Poppy Mallows are not very hardy, but as they are plants of distinct beauty, many would be sorry to dispense with them. There are both annual and perennial forms, but in the notes below only the latter are described. These may be grown in the usual way for hardy perennials, in light, rich garden loam in a sunny site, save for the fact that winter protection is desirable. Propagation may be effected in the usual way by seeds and division of the roots, also by cuttings of young growth about June or July. We recommend the following :—

Callirhoë alcaeoides (Syn. *C. macrorrhiza*).—This is available in many colours, including red, rose, carmine, purple, pale pink, and white. It blooms from July to August, and grows 12 ins. high.

C. involucrata.—This is a most attractive sort, bearing vivid red flowers from July onwards, and growing about 6 ins. high.

C. macrorrhiza.—Syn. *C. alcaeoides* above.

C. Papaver.—Probably this is the most popular species of all. It bears violet-red flowers from July to August, and averages 1 yd. in height.

POPPY, OPIUM.—See OPIUM POPPY in *MEDICINAL HERBS.*

POPULUS.—For the best species see *TREES.*

PORCUPINE GRASS (*Stipa spartea*).—See *STIPA.*

PORE CLOSING.—The meaning of this term is explained under TRANSPIRATION in *PLANT PHYSIOLOGY.*

PORRUM. — Now included in the genus *ALLIUM.*

PORTLAND SPURGE (*Euphorbia portlandica*).—See *EUPHORBIA.*

PORTUGAL CABBAGE.—See *COUVE TRONCHUDA.*

PORTUGAL LAUREL (*Pinus lusitanica*).—See *TREES.*

PORTUGUESE HEATH (*Erica lusitanica*).—See *HEATHS.*

PORTULACA.—See *ANNUALS, HALF-HARDY: LIST OF; PURSLANE, ANNUAL;* and under PURSLANE in *SALAD PLANTS.*

POST OAK (*Quercus stellata*).—See *TREES.*

POT CULTURE OF CARNATIONS.—See *CARNATIONS.*

POT MARIGOLD (*Calendula officinalis*).—See *MARIGOLD.*

POT MARJORAM (*Origanum Onites*). See *ORIGANUM.*

POT PLANTS: TOP-DRESSING FOR.—See *TOP-DRESSING.*

POT SIZES.

Various names are given to different-sized pots which prove puzzling to uninitiated amateurs, so we give a list below of the names of the various sizes with the measured diameter :—

Thimbles	2	ins.	across the top.
Thumbs	2½	,,	,,
Seventy-twos	2½	,,	,,
Sixties	3	,,	,,
Forty-eights	4½	,,	,,
Thirty-twos	6	,,	,,
Twenty-fours	8½	,,	,,
Sixteens	9½	,,	,,
Twelves	11	,,	,,
Eights	12	,,	,,
Sixes	13	,,	,,
Fours	15	,,	,,
Twos	18	,,	,,

The last three sizes are very seldom used. There is no popular name for a 5-in., 8-in., or 10-in. pot.—E.

POT VINES.—See *VINES*.

POTAMOGETON (Pondweed, Nat. Ord. Naiadaceæ). — This is a large family of hardy aquatic perennials which grow under water in ponds, etc. They are of easy culture, but of little value, bearing only insignificant greenish flowers in June and July. The best known species are *P. densus*, the Water Caltrops, and *P. natans*, also known as the Tench Weed. *P. crispus* and *P. lucens* (Syn. *P. acuminatus*) are also sometimes grown.

POTASH and POTASH COMPOUNDS. See *POTASH AND POTASSIUM COMPOUNDS*.

POTASH MANURES.—See *MANURES*, and *POTASH AND POTASSIUM COMPOUNDS*.

POTASH AND POTASSIUM COMPOUNDS.—Potash in some form is essential for all forms of plant life; it is the keynote of successful gardening, and if its need was more fully realised there would be very many fewer failures. As a general rule potash is used as a fertiliser, but there are one or two striking exceptions to this rule, as we shall see.

Forms of Potash.—Should the gardener glance down a chemical list he will note "Potash—see Potassium," and when he refers to potassium he will find that there are more than sixty different forms of it. Of these, however, only a few are useful to him, and these are briefly dealt with below. As regards natural forms of potash, we may point out that Kainit is rich in it, but besides the sulphate of potash which it contains there is also a good deal of salt and magnesium chloride. Clay soils are rich in potash in an insoluble form; to release this, such soils should be thoroughly trenched and heavily dressed with freshly burnt ground quicklime. Wood Ashes also contain it (see the article on *ASHES: THEIR VALUE IN THE GARDEN*). Animal manures all contain varying quantities of it, and some guanos, such as Fish Guano; also poultry manure and seaweed both contain it.

Application of Potash.—Impure forms of potash which may contain injurious chemicals should be applied in the early winter to allow the weather to act upon them and wash out their impurities. A fact not generally known is that soils cannot hold potash unless chalk or some form of lime is present. This is probably the reason why certain gardeners can see no beneficial results accrue after an application of potash—naturally there are no benefits if the material has been washed out of the soil. There are very few plants which do not repay well a dressing of potash, but if it is scarce, it should in preference be given to crops such as beet, carrots, onions, parsnips, potatoes, potato onions, and salsafy, also to fruit trees.

We will now say a few words about the different potash compounds.

POTASSIUM CARBONATE is the first compound on our list. In its impure state it is what is commonly known as POTASH or PEARL-ASH. If it is boiled with lime and the liquid filtered and evaporated, caustic potash (Potassium Hydroxide, which see) results. Carbonate of potash, as it absorbs water very readily and is very caustic, is not much used in the garden, but it can be used as a dressing for rose beds and the general garden at the rate of 1–2 oz. per sq. yd. so long as it is dug in in the early winter.

POTASSIUM CHLORATE.—This is not used as a fertiliser but as an oxidising agent. It can be used to help with the burning out of wasps' nests, or for giving a good start to the burning of sulphur in greenhouses.

POTASSIUM CHLORIDE or MURIATE is another little used compound of potash. So long as it is applied in the autumn and at the rate of 1–2 oz. per sq. yd., it will be found a good fertiliser for vegetables generally, also fruit trees and herbaceous plants. It is never advisable to apply it in the spring as it has a deleterious effect on seedlings and small plants.

POTASSIUM CYANIDE.—This is a deadly poison and used for making hydrocyanic acid for fumigating. See HYDROCYANIC ACID under the title *ACIDS: THEIR USES IN HORTICULTURE*. None of this salt should be left lying about.

POTASSIUM FERRO-CYANIDE can be used for testing the presence of iron in soils. Dilute hydrochloric acid is poured over a sample of soil and stirred. Excess of acid is neutralised with carbonate of soda, and then some dilute ferrocyanide of potash poured in. If iron is present a change of colour takes place.

POTASSIUM HYDROXIDE.—This is caustic potash. It is a frequent ingredient of winter washes for fruit trees, and can, as described above, be made from carbonate of potash. As the hydroxide burns holes in clothes and flesh, care should be taken in handling it. The pure chemical, which will probably arrive in the form of sticks, should be kept in tightly lidded pots or tins, otherwise it will absorb water from the atmosphere and dissolve therein.

POTASSIUM MURIATE is the same as the *Chloride*, and has been dealt with under this heading.

POTASSIUM NITRATE is an expensive manure but well worth its cost. It is as quick a manure as nitrate of soda (see *SODA AND SODIUM COMPOUNDS*), and a better manure in every way since it supplies potash as well as nitrogen. It should contain about 40 per cent. of potash, and 12½ per cent. of nitrogen. As a stimulant, it is almost unrivalled. It can be used at the rate of ½ oz. per gallon of water occasionally during the summer to growing flowers and crops. Potassium Nitrate is also known as Saltpetre or Nitre—it is quite distinct from Chile Saltpetre. There are nitre beds in India. Some of it can be obtained by purifying the drainings from manure. Nitrate of potash is often adulterated. Common salt, which is similar in appearance, is the chemical most often used for this purpose. Gardeners can tell, however, whether it has been thus adulterated by dissolving an ounce or so in a little water, and adding a small quantity of silver nitrate solution. If salt has been used to adulterate it there will be a white compound formed in the liquid which will fall to the bottom. This is silver chloride.

POTASSIUM PERMANGANATE.—This is little used by the gardener. A tiny crystal can be put into the water of cut flowers to keep it pure. It is largely used for giving soil fumigants their dark colour. Experiments with permanganate as a remedy for wart and other diseases of crops have failed to prove it useful.

POTASSIUM PHOSPHATE.—This compound is very soluble in water and highly valuable as a fertiliser. It is a stimulant of first-rate merit for nectarines, peaches, tomatoes, and other glasshouse fruits; for sweet peas and exhibition flowers; for culinary peas, runner beans, onions, and other vegetable crops. Unfortunately it is expensive and difficult to get, but manure makers should realise that were a supply put on the market at a cheap rate there would be no lack of purchasers for it. Phosphate of potash absorbs water readily, so should be kept in air-tight tins or pots. It is not applied as a "land dressing" but as a summer stimulant. One-quarter ounce per gallon of water occasionally will be quite enough.

POTASSIUM SILICATE.—The form of this which comes to the gardener is dilute water-glass, after it has been used for preserving eggs in the kitchen. This material is not of great value, but it can be spread out in a thin layer on light soils and dug in during the winter.

POTASSIUM SULPHATE, or sulphate of potash, is the well-known potash fertiliser, so we need not say a great deal about it here. It can be used as a land dressing at the rate of 1–2 oz. per sq. yd. in the spring, and again in the summer, working it well in. It increases the quality of all crops, but is specially good for tuberous and tap-rooted vegetables. It can also be used as a summer stimulant at the rate of 1 oz. per 2 gals. of water occasionally. Sulphate of potash should dissolve completely in water. If it will not, then it is impure and should be rejected.

POTASSIUM SULPHIDE.—The active ingredient of Liver of Sulphur is Potassium Sulphide, a chemical unpleasant in its use but highly effectual as a fungicide. It is used at varying strengths, from 1 oz. in 10 gals. of water to 1 oz. in 3 gals. of water. Soft soap is often added. This solution ruins white paint in greenhouses, and should not be used unless the gardener has been told that zinc paint instead of lead paint has been used for such structures. References to this sulphide, liver of sulphur, are made in the article on *Spraying Mixtures* to which the reader is referred for further information.—E.

POTASSIUM SULPHIDE.—See *Potash and Potassium Compounds* and *Spraying Mixtures and Fungicides.*

POTATO (Type: *Solanum tuberosum.* Nat. Ord. Solanaceæ).—Thanks to the accommodating nature of this, no matter where planted, one is pretty certain of getting at least a satisfactory return for the outlay. In fact, so accommodating is this that, providing a change of seed is obtained every second season, profitable crops may be taken every year from the same plot of ground without following the usual Rotation of Crops, thought by many to be so necessary with many other vegetables.

[Our contributor is quite correct in his assertion that the above may be done. But we should never advise this to be carried out where a Rotation was possible. We are of the opinion that Rotation should be much more adopted than it is. Unless care is taken to avoid growing "similar" varieties as a change of seed, the crops will soon be reduced. The potato, even though such a common well-known vegetable, deserves good treatment such as is recommended by our contributor below; and we have always found it well repays any trouble bestowed upon it.—EDITOR.]

Where quality combined with quantity is desired, good drainage is of great importance; if this is lacking, not only will the tubers when cooked be of a soapy nature, but in a wet season even the reputed disease-resisting varieties will be found to be very badly affected; and what appear to be perfectly sound tubers, will show signs of decay after being in store a short time.

Preparation of Land.—Soils inclined to be pasty or which work badly, should be very liberally treated with road-sidings, burnt turf, or ashes from a garden smother, while if a few loads of old builders' rubbish can be had cheaply, a dressing of this will not only bring the soil into better working condition, but have a marked beneficial effect upon the quantity of the crop.

The ideal potato soil is a good loam in a high state of fertility, brought to this state by continuous manuring, and proper aeration by early winter preparation.

Even the most fertile soil will be all the better for a moderate application of manure; and although very good results may follow the use of one of the well-known "prepared manures," still better are assured by using these with a fair amount of animal manure.

Where it can be obtained, manure from a mixed farmyard is undoubtedly preferable to that from any one class of animals; and it is important that this should be used in a well-rotted state. Potatoes grown upon land manured with nearly fresh dung are apt to run very much to leaf, and the tubers will be scabby. As a guide to what may be termed a fair dressing of manure, soils of a very hungry or sandy nature should have not less than two good barrow loads applied to each square rod of ground, and half as much again would be even better. Heavy soils are best manured as early in the year as possible, but others of a sandy nature may be left until a short time before planting.

If the dressing of manure advised is supplemented at the time of planting, or after the tops of the potatoes are a few inches above the soil, by a dressing of one of the popular "complete potato manures," or each square rod given a dressing of the following home-made mixture, a good crop of medium to large-sized tubers is assured:—

FORMULA: POTATO MANURE.

Superphosphate of Lime .	2½ lb.
Sulphate of Ammonia . .	¾ lb.
Sulphate of Potash . .	3 lb.

This should be kept well off the tops and be immediately stirred into the surface with the hoe.

Planting.—The advantage of planting well-sprouted seed sets is now fully recognised, and wherever possible, steps should be taken to secure each set being well chitted at the time of putting in the ground.

The size of sets is really not so important as many would have us believe; although in our opinion the ideal size is that suggesting a bantam's egg, or weighing about 2½–3 oz., it must be confessed we have lifted wonderful crops resulting from planting sets much larger, also much smaller than these; while the fact that heavy crops are taken each year by those who plant single eyes shows the absurdity of laying down any hard-and-fast rule. It all depends upon the state of the soil, the season, and the source from which the "seed" was obtained; we have frequently proved a 3-oz. set from the home-raised crop will give a far lighter crop than one but half its weight purchased from Ireland or Scotland; Lincolnshire-grown seed giving good results in most soils, particularly those of a heavy nature.

The number of shoots, or chits, these sets are allowed to carry must be determined by the size of the tubers the grower is most anxious to secure. One shoot per plant usually means very large tubers; two shoots per plant medium tubers; three or more, a mixed crop, but very few above the ordinary size.

Non-sprouted early varieties may be planted in a warm border in March, but any time from early March until the end of April will be soon enough for the maincrop or late varieties. Well-sprouted sets, carrying good healthy shoots an inch long, should not be planted in cold soils until quite the end of April, or an unexpected frost may delay if not completely ruin the crop. [In the North the planting of unsprouted tubers is not wise before 15th April, and all planting is considered quite early enough if completed by the third week in May.—EDITOR.]

Plant with a garden trowel, or, better still get out trenches 6–8 ins. deep with a spade or the corner of a good hoe, and carefully lay the tubers in these at the proper distance apart, covering with fine soil. Sets planted in this manner grow away very rapidly and well repay the extra trouble.

For the early varieties which are less robust in growth than others, 15 ins. between the rows and 1 ft. between the sets will be ample; but when planting others which do not complete their growth until August or September, 2 ft. must be allowed between the rows, or where it is intended to plant winter greens between the potatoes while these are still growing, nothing less than 30 inches or even more between the rows is advisable.

After Cultivation.—When the plants are well through the ground, the earth on either side of the runs should be drawn up to them in order to prevent the tubers produced near the surface becoming green through exposure to sun and air. Where doubts are entertained regarding the fertility of the soil, it is when the plants have reached this stage that additional help may be given in the shape of the fertilisers above mentioned.

Spraying as a preventive against disease has much to recommend it, and one is pleased to find the practice becoming pretty general. The time to commence is when the tops are about a foot above the soil; a second spraying being given in a fortnight's time; and should dull, muggy weather prevail, a third spraying will be labour and money well spent.

There are so many excellent spraying compounds now on the market all of which may be depended upon to be perfectly safe to use even by inexperienced persons, that the purchase of these is recommended in preference to any home-made mixtures. But whatever is used, care must be taken to wet the underside of every leaf thoroughly, this being more important than the tops. [See also article on *POTATO BLIGHT*.—EDITOR.]

The early crop should be ready for lifting from the middle to the end of June, a trifle later in some districts and some seasons; late or main crops may be lifted as soon as the tops die down in the autumn.

Storing may be done either in cool sheds, cellars, or what are known as potato pies, or clamps; in every case the chief object must be to prevent light reaching the tubers, and at the same time to secure against frost. [See *VEGETABLES: HARVESTING AND STORING*.—EDITOR.]

Varieties:—*First Early*.—Eclipse, Harbinger, May Queen, Midlothian Early, Ninetyfold, Ringleader, Sharpe's Express, Sharpe's Victor, and Witch Hill Seedling.

Second Early. — British Queen, Epicure, Snowball, Snowdrop, The Admiral, Windsor Castle.

Maincrop or Late Varieties.—Arran Chief, Colleen, Crofter, Dalhousie, Drummond Castle, Factor, Golden Wonder, Irish Queen, Irish Wonder, King Edward Seventh, Queen Mary, Rob Roy, The Chapman, and The Provost.

F. R. C.

[For important sorts which are similar, if not indistinguishable except in name, the reader should refer to the Board of Agriculture's List of Wart Disease-resisting Potatoes published in December or January each year.—EDITOR.]

UP-TO-DATE SELECTIONS.

Alannah.—Good midseason.

Arran Banner.—White round.

Arran Rose.—This is an early sort, with strong haulm and shallow eyes.

Arran Consul.—Second early white oval.

Arran Crest.—Early immune.

Arran Pilot.—First early white kidney.

Burnhouse Beauty.—This is a second early sort, with strong haulm and shallow eyes.

Advancer.—Early white pebble.

First Crop.—Early yellow kidney.

Longkeeper.—Maincrop oval.

Royalty.—Second early oval white.

Catriona.—Second early kidney.

Culdees Castle.—This is a maincrop variety, with strong, spreading haulm. The eyes are shallow.

Doon Pearl.—Maincrop immune.

Dunbar Cavalier.—Maincrop immune.

Dominion.—This is a maincrop sort, with vigorous and somewhat spreading haulm. The eyes are shallow.

Kerr's Pink.—This is a maincrop variety, with tall, upright haulm, and medium to very deep eyes.

King Albert.—This is an early maincrop sort, with strong, upright haulm, and shallow eyes.

Majestic.—This is a maincrop variety, with medium and spreading haulm. The eyes are shallow.

Mine Own.—Early.

Nithsdale.—This is a maincrop sort, with medium and spreading haulm. The eyes are shallow.

Queen of the Veldt.—Coloured kidney.

Response.—Midseason.

Secundus.—This is an early maincrop sort, with strong, upright haulm and shallow eyes.

Sefton Wonder.—Midseason.

Ben Lomond.—Second early immune.

Commander. — Early maincrop immune.

Epicure.—First early white round.

Glasgow Favourite.

Harbinger.—First early round.

Inverness Favourite. — Maincrop immune.

May Queen.—First early kidney.

White City.—Maincrop immune.

The Duchess.—This is a second early variety, with moderately vigorous, spreading haulm, and eyes of medium depth.

Warwick Castle.—This is a second early sort, with strong, upright haulm, and shallow eyes.

Crimson Kidney.—Second early red kidney.

Colonist.—First early white kidney.

Empress. — First early white kidney.

Prosperity. — White oval maincrop.

Red King.—White kidney maincrop.

Renown.—Maincrop immune.

Tinwald Perfection (*W. K.*).—This is a maincrop sort, with medium spreading haulm and shadow eyes.

Warwick Castle (*W.R.*).—This is a second early sort, with strong, upright haulm, and shallow eyes.

POTATO: The Ally.—In a potato-growing contest in 1919 a Sheffield allotment holder lifted a crop of this variety which amounted to 29$\frac{5}{7}$ tons per acre, over 200 lb. being yielded from half a stone of seed. This weight is a record, and was obtained by planting the seed whole in land dressed with flue dust, a little animal manure being put above the sets. The Ally is an inexpensive, early maincrop variety of excellent flavour, and a good keeper.

POTATO BLIGHT (*Phytophthora infestans*).—This, the most destructive of all potato diseases, is caused by the microscopic fungus named *Phytophthora infestans,* which not only attacks and blackens the haulm but also destroys the tubers. In 1845 it devastated the potato crop in Ireland, causing widespread suffering, and ever since that date has been recognised as a serious menace to potato growing.

The disease starts as a rule in June or July, when the well-known black patches appear on the leaves accompanied by the delicate white mould on the under surface. It is the presence of this white or grey mould around the affected areas which distinguishes Blight from black spots on the leaves caused by aphides and other agencies. If the weather be damp and warm the disease spreads rapidly, plant after plant becoming affected and the haulm blackened and destroyed. If, on the other hand, the weather turns dry the disease is checked, in fact the intensity of attacks of Blight in this country are almost entirely dependent on the nature of the season. It is, of course, by means of spores that the disease is distributed. These are produced on the white mould seen on the affected leaves; they are readily carried by rain, wind, insects, etc., from plant to plant, and if the climatic conditions are favourable they germinate and cause new patches of disease from which innumerable fresh spores are liberated within the course of a few days.

The disease in the tubers is the result of the presence of the fungus in the leaves. Spores fall in profusion from affected leaves, and finding their way to the tubers present in the soil, readily infect them. Those tubers nearest the surface are naturally most seriously affected. A large amount of infection also takes place whilst the potatoes are being lifted, spores being blown from diseased haulms on to the tubers. The tubers at the time appear to be and are healthy, but the spores germinate and infect them, and later on the effect is seen by decay in storage.

The infection of tubers can be easily detected by the presence of dark, depressed areas which it will be noted are usually on the upper surface. Inside the tubers the result of the fungus invasion is seen in the formation of the well-known brownish-red patches. Spore infection so far as is known is the only way by which tubers become affected. No scientific support has been found for the theory formerly held that the mycelium of the fungus passes down inside the haulm and along the rhizomes into the tubers.

The rapidity with which decay

takes place varies with the time of year and differs also in different varieties. In some varieties decay is slow, in others, such as *British Queen*, very rapid rotting may suddenly occur during autumn when tubers have been clamped. During the winter and spring, however, a large amount of decay takes place amongst all varieties through the spread of the disease in the flesh of tubers which were infected by spores during the previous summer and autumn.

The initial outbreaks of disease at the beginning of the season arise in the following manner. A certain number of affected tubers remain tolerably sound till spring. If these are planted as "sets," some die, others give rise to healthy plants, whilst a few produce, in addition to healthy shoots, a few dwarf diseased shoots on which spores are sooner or later developed. It is these shoots which are the initial source of infection, and under favourable weather conditions they infect surrounding plants. The outbreaks of disease each season are traceable to the use of diseased sets, a few of which, as stated above, give rise to diseased shoots. The tubers may often be only very slightly affected and hardly noticeable. It is therefore evident that it is impossible to prevent such cases occurring, and they do in fact all over the country both in gardens and fields. Outbreaks of Blight must accordingly be regarded as inevitable, and energies should be concentrated in checking its spread and preventing damage. Amongst minor methods may be mentioned the allowance of a liberal amount of room between the rows, careful and thorough earthing up, and the removal of the haulm when once it is badly diseased.

Spray Your Potatoes.—The best preventive of Blight is, however, a good spray, such as Bordeaux or Burgundy Mixtures. See article on *SPRAYING MIXTURES AND FUNGICIDES* for methods of making these solutions. The spraying mixture covers the leaves with a protective covering of the copper compound, and spores alighting on this film cannot produce the disease. Spraying does not entirely prevent the disease, since it is obviously impossible to cover the leaf surface completely, still less does it destroy it when once the fungus is within the tissues; but according to carefully conducted experiments it does, if applied properly and thoroughly, very materially *reduce* the amount of infection in the foliage, and consequently loss of crop. In addition it often increases the crop by prolonging the growth of the haulm.

Spraying should begin early in July for the greater part of England, and somewhat earlier in the south-west. It may be left to the last week in July for the north-eastern counties. A second spraying should be given three weeks after the first, and in most seasons a third is desirable; in fact, it is often the third spraying which saves the crop. If severe rain follows any one spraying, the operation must be repeated. Spraying should not be done, if possible, under a very hot sun, as scorching is apt to follow. The amount of mixture required for ¼ acre is 30 gals., or 7½ gals. per 10-rod plot. For the second and third spraying a somewhat larger amount will be required. For the proportions of chemicals required and the instructions for mixing, see article on *SPRAYING MIXTURES AND FUNGICIDES.*

Whilst spraying is theoretically sound and is practised extensively and regularly in many parts of the country with marked success, it is undoubtedly true that the operation does not always yield the increased crop which one would expect. In many cases, moreover, scorching is complained of. The explanation of the non-success is sometimes difficult to arrive at, but at other times the cause of failure is easily discoverable and may be obviated if more care be exercised. Scorching, for instance, is usually brought about through some kind of faulty application of the mixture (*e.g.* improper preparation, use in a stale state, or application in very hot sunshine), but it also occurs in the neighbourhood of manufacturing towns and cities as a result of the influence of town smoke and where plants are attacked by Aphis.[1] In large industrial areas, therefore, such as parts of Lancashire and Yorkshire, it is doubtful whether spraying is a profitable operation.

Another frequent cause of apparent non-success of spraying is lack of care at lifting time. Tubers which have been preserved from Blight by spraying are left exposed to wind-borne spores after lifting (see above), or covered with potato haulm, a most unwise practice. The *most* important factor, however, is the nature of the weather during and after spraying time. The ideal time to choose is two or three days before the wet spell, so that the spray may have time to dry thoroughly, but as no grower can predict the weather with certainty, there is always an element of chance. In some seasons the fates seem against one. Rain may wash off the mixture before it dries, and while the grower is waiting in vain for a fine day, Phytophthora gets a hold and does its deadly work.

For many counties of England it is still an open question whether spraying is or is not worth the trouble and expense, and only carefully conducted experiments lasting over several years can settle the question. The future may have in store varieties altogether immune to Blight, in which case this troublesome operation may cease, but for the present it is advisable to do what one can to secure the crop against waves of disease by means of a careful and thorough spraying.

Potato Blight on Tomatoes.—Tomatoes both out of doors and under glass are often attacked by Potato Blight, the spores from diseased potato haulm passing to the Tomato and causing infection. Indoors the disease may appear fairly early (July), but outdoors it occurs chiefly from the beginning of September onwards. Both foliage and fruit are attacked, the former showing the white mould as in the potato, and the latter becoming mottled with brown markings and turning rotten. A large quantity of green fruit outdoors is annually lost late in the season by the Blight fungus.

REMEDIES.—Tomatoes outdoors should not be planted nearer main-crop or late potatoes than necessary, and should be sprayed with Burgundy or Bordeaux Mixture in July and August. Under glass fire heat and ample ventilation, so as to produce a dry atmosphere, will usually dispel the disease, but spraying should be resorted to as a preventive if potatoes are grown near to the house.—A. D. C.

---

[1] In some potato-spraying experiments conducted by the Editor in an industrial city during the summer of 1918, clear evidence of scorching being due to smoke fumes was obtained. It was found, however, that the plants sprayed with Bordeaux Mixture were hardly scorched at all, hence the advisability of using this mixture as preferred to Burgundy Mixture in such cases. Various preparations of soap, some of which had been widely advertised, were tried; these did not result in any scorching, but did not keep down the Blight. Where Aphis is troublesome on potato haulm it is advisable to spray with quassia and soap (see article on *INSECT PESTS: General Methods of Destruction*) first, and to follow with the usual spraying mixture a few days later.

POTATO BLIGHT ON TOMATOES.—See *POTATO BLIGHT.*

POTATO DISEASES.

[The following notes on diseases of the humble "spud" will be useful to readers in addition to the previous article on *POTATO BLIGHT.*—EDITOR.]

Black Leg or Black Stem Rot (*Bacillus phytophthora* and others).—This disease, which is conveyed in the "seed," is common and at times does much damage. It shows early in the season from June onwards, producing stunted plants with yellow leaves. The stems become black at the base and rot away and are easily pulled up. This blacking of the stem is characteristic and gives its name to the disease. Tubers of affected plants become soft and rotten, decay taking place at once or later on when the tubers are stored.

REMEDY.—Diseased plants should be marked, dug up, and destroyed in summer; the sound tubers may be eaten, but not kept for seed. Sound seed should be procured, if possible, only from a source known to be free from disease. Infected land should not be planted with potatoes for at least a year.

Black Speck, or Rhizoctonia Scab (*Rhizoctonia Solani*).—The specks or black bodies formed on the skin of potato tubers by this fungus, though often very conspicuous, are in reality of little consequence. They can be scraped off with the finger nail, leaving no mark, and do not injure the flesh. The fungus in Europe does little harm, though occasionally it injures the young shoots, and if the specks are present in quantity it spoils the appearance of the tubers. The fungus is so generally present in the soil and does so little harm that control measures, even were they feasible, are unnecessary.

Common Scab, Brown Scab, or Land Scab (*Actinomyces sp.*).—This exceedingly common affection of potato tubers is particularly abundant in small gardens and old allotments, especially where ashes, road sweepings, and lime rubble have been applied. The scab is now known to be due to the micro-organism *Actinomyces*, which is favoured by the presence of these substances, and not to the irritating action of the substances themselves as was formerly thought. The scabbing is confined to the surface layers of the tubers, and affected potatoes are often of good eating quality.

REMEDIES.—Scabbing is favoured by alkalinity of soil, therefore the acid-forming manures sulphate of ammonia and superphosphate of lime should be used in preference to others. In small gardens flour of sulphur (1 oz. to sq. yd.) is useful. Badly scabbed tubers should if possible not be used for "seed" as the eyes are apt to be weakened.

Corky or Powdery Scab (*Spongospora subterranea*).—In a mild form corky scab forms small round pimples on the skin and is comparatively harmless; in bad cases it produces large cankerous wounds. It is worst on wet and ill-drained soil and is favoured by the use of lime. The disease is more common in the Midlands and in the North than in the southern counties.

REMEDY.—Tubers with corky scab should preferably not be used for seed, but if dipped in dilute formaline solution for ninety minutes (¼ pint to 15 gallons of water) they may safely be planted. Wet ground should be avoided or properly drained, and acid manures such as sulphate of ammonia and superphosphate of lime given instead of nitrate of soda or basic slag. Lime should be avoided, but in small gardens flour of sulphur applied at the rate of 2½ oz. per sq. yd. is useful.

Dry Rot (*Fusarium caeruleum*).—A storage rot of the tubers, and prevalent from December onwards, increasing with the approach of spring, hence also known as **Winter Rot**. Early varieties are most susceptible. The fungus causes depressed areas in the tubers often surrounded with concentric zones and bearing white or pale pink pustules, masses of spores. Later the tubers become hard and dry.

Remedy.—Though wounds are not essential, they greatly assist the entry of the fungus. Great care, therefore, should be exercised when digging and handling seed potatoes, especially early varieties. Affected tubers should not be used for seed. Diseased tubers cannot be saved. The storage place should be cool and well ventilated, and the stores frequently examined (if Dry Rot is likely to develop), and all diseased potatoes at once removed and burned.

Leaf-curl. — The potato plants affected by this disease are characterised by an upward, inward roll of the leaflets, an erect, rigid appearance, some stunting of growth, and the frequent occurrence of red, purple, or yellow coloration. The trouble is worse on dry lands and in dry seasons. The cause is still rather obscure, and so far in England the damage has not been so great as on the Continent and in the United States. The yield, however, from affected plants is decreased and the tubers run small.

Remedies.—Seed from good stock (preferably from a northern source rather than a southern or dry district), good cultivation, and the rotation of crops are all that can be recommended.

Sprain.—Potatoes that on the outside are apparently sound sometimes show rusty brown streaks and specks of dead spongy tissue when cut open. The trouble has been known, though rarely, to be faintly indicated also on the outside. The cause of this disease remains obscure. It occurs on dry, sandy soils, especially if lacking in lime, and is rare on strong, heavy soils. It is most frequent in the north of Great Britain, and is more prevalent in a dry season. No remedy other than avoiding the above predisposing conditions can be recommended.

Wart Disease of Potatoes (*Synchytrium endobioticum*).—Wart Disease, Black Scab, or Cauliflower Disease is a most serious menace to potato growing. It causes great loss of crop, and is exceedingly difficult to eradicate. The fungus, which lives in the soil, produces abnormal outgrowths on the potato, resembling warts or pieces of cauliflower. These are at first white, but become black. The tuber may lose all likeness to a potato and become a mere mass of excrescences, which presently rots away, leaving the spores of the disease in the soil. Occasionally the lower leaves are affected. The disease is easily conveyed from one district to another by means of contaminated soil and contaminated seed-tubers, and, once infected, soil remains capable of producing the disease for years. Hence great care should be exercised in the distribution of seed tubers.

Remedy. — There is only one remedy known, namely, the planting of immune varieties. A list of

These can be obtained from the Board of Agriculture. Wart Disease is notifiable under the Destructive Insects and Pests Acts, 1877–1918, and outbreaks should be reported to the local authority or to the Board of Agriculture.—A. D. C.

POTATO MANURE: A GOOD.—See *POTATO.*

POTATO ONIONS.—See *ONION.*

POTATO PLANTING.—See *PLANTING.*

POTATO: SAVING SEED OF.—See *SAVING SEED POTATOES* and *SEED SAVING.*

POTATO SPRAYING.—See *POTATO BLIGHT.*

POTATO STEM MOTH.—See *INSECT PESTS.*

POTATO TREE (*Solanum crispum*).—See *CLIMBING AND TRAILING PLANTS.*

POTATOES.—See *POTATO.*

POTENTILLA (CINQUEFOIL.[1] Nat. Ord. Rosaceæ). — Certainly the hardy perennial species of this include some of the finest of all flowers, glorious alike for border and house decoration. The flowers last well when cut, and are most attractive.

Culture.—The plants thrive well in ordinary light garden soil in a sunny position. Plant any time from November to March, and give abundance of moisture in dry summer weather. They may easily be propagated by seeds or division of the rootstock, the former method of increase taking place in spring or summer, and the latter in late autumn or early spring.

Perennial Border Species.—Below is a selection of desirable sorts :—

Potentilla alchemilloides.—A white species blooming throughout the early summer, and suitable alike for the margins of borders and rock garden. Height, 6–9 ins.

P. arguta.—A light yellow species blooming in June and July. Height, 9–12 ins.

P. argyrophylla.—A yellow species blooming from June to September. Height, 1–2 ft.

P. a. atrosanguinea.—This is the *Potentilla atrosanguinea* of the nurseryman. Its dark crimson flowers are well known. It will usually bloom the whole summer, and in height it is about 1 ft.

P. atrosanguinea.—See above.

P. formosa of nurserymen. See *P. nepalensis.*

P. fruticosa.—A yellow species often grown as a shrub and not as a herbaceous perennial. It blooms in July and August. Height, about 3 ft.; sometimes more.

P. grandiflora.—A fine yellow species with larger flowers than some. It blooms from June to September, and its height is 1 ft.

P. hopwoodiana.—A species often offered by the trade, but not so good as some. Its flowers are rose and white and it blooms freely in June and onwards. Its height is about 1½ ft.

P. hybrida.—There are a great many hybrid named varieties which are first class for the perennial border. Improvements are rapid, and it will be best for readers to consult hardy plant specialists on what to buy, as any list given here would soon be out of date.

P. laciniosa.—A yellow June flowering variety of *P. recta* about 2 ft. high.

P. nepalensis.—A fine blush-pink species, with dark crimson centre, blooming in July, August, September, and October. Height, about 1½ ft. Miss Willmott's variety is dwarfer.

P. pensylvanica.—A yellow summer flowering species about 1½ ft. high.

---

[1] The SILVERY CINQUEFOIL (*P. argentea*); the SILVER WEED (*P. Anserina*); and the TORMENTIL (*P. Tormentilla*) are not much grown in gardens.

P. pyrenaica.—A deep yellow species, flowering freely most of the summer. Height, about 15 ins.

P. recta.—A yellow June flowering species, quite useful. Its height is about 1 ft.

P. rupestris.—A white species blooming in June. Height, 1½ ft.

P. russelliana.—A useful hybrid variety. Its flowers are of a rich dark scarlet colour and freely produced in the summer. Height, about 1 ft.

Rock Garden Species. — These number a dozen or more. They thrive in well-drained soil in sunny situations. All are perennials, and are propagated by division in spring.

Potentilla ambigua.—This forms dense masses of evergreen foliage. Flowers rich yellow. Site sunny. Soil sandy loam. Flowering Period, June to August. Height, 4 ins.

P. nevadensis.—A dwarf compact plant. Flowers yellow. Site, open. Soil gritty. Flowering Period, May to July. Height, 4 ins.

P. nitida.—This forms dwarf mats of silvery ternate leaves. Flowers pale rose. Site sunny. Soil gritty. Flowering Period, June to September. Height, 3 ins. Its variety *alba* has white flowers, but is otherwise similar.

P. splendens.—A sort forming spreading tufts of grey leaves. Flowers white. Site sunny. Soil gritty. Flowering Period, May to August. Height, 9 ins.

P. tridentata.—This forms carpets of green foliage. Flowers white. Site, half-shade. Soil sandy loam. Flowering Period, June to September. Height, 3 ins.

P. villosa.—A sort forming small tufts of silky-haired leaves. Flowers yellow. Site sunny. Soil gritty. Flowering Period, June to August. Height, 6 ins.

See also *SHRUBS.*

POTERIUM (Syn. *Sanguisorba*, Burnet, Nat. Ord. Rosaceæ).—Nearly a dozen species of this genus, most of them of comparatively small value, are grown at Kew. All are hardy herbaceous perennials, some of which are of weedy appearance, and all thrive with great freedom in ordinary common garden soil. They may be propagated by seeds and division of the roots at the usual times, and planted any time between October and March. We recommend the following :—

Poterium alpinum.—This is a purple sort blooming from July to August, and growing about 2 ft. high.

P. canadense.—This is probably the choicest species. Its white flowers are borne in July and August, on plants about 1 yd. in height.

P. tenuifolium. — This and its variety *album* bear purple and white flowers respectively from June to August, and average nearly 1 yd. in height.

New Species.

Poterium obtusum. — This bears bright rose flowers on branching spikes 2–3 ft. high.

POTHERBS.

All the ordinary sweet or savoury herbs of the kitchen garden, besides being of use for seasoning, have a value in medicine, chiefly for the sake of their aromatic and disinfectant oils. The majority of the Potherbs belong to the Labiate Order. As a general rule all can be propagated by cuttings or by division of roots. The culture for all is along very similar lines, although some require moist soil, and some dry, while others seem to do well in any spot. In many cases the beds require to be made afresh every year.

Marketing.—This is quite simple. Potherbs should be tied in bundles of equal size and length and bung up to dry in a warm current of air out of the sun, and protected in some way from dust. When the leaves are quite brittle they can be stripped from the coarser stems. The herbs should be stored or packed in air-tight containers, otherwise they will reabsorb moisture from the air, ferment, become discoloured, and spoil.

We give below notes on all the important Potherbs :—

American Horse Mint (*Monarda punctata.* Nat. Ord. Labiatæ).—This is the source of Thymol, one of the "stearoptenes" or solid volatile oils. It is a handsome Labiate plant much like the better known Bergamot (*Monarda fistulosa*) of the garden border. Any good soil suits it, and propagation is easily effected by cuttings. The whole herb is used.

Balm (*Melissa officinalis.* Nat. Ord. Labiatæ).—This will thrive in any ordinary garden soil, and is easily propagated by cuttings. Remake beds annually.

Basil (*Ocimum Basilicum.* Nat. Ord. Labiatæ).—A tender exotic annual, which must be raised from seed in heat. Sow in April, prick out into boxes to strengthen, and plant out about 1 ft. apart in June on beds of rich, light soil. Lift the herb in September, and pot in warm greenhouse for the winter.

Calamint (*Calamintha officinalis*).—This is grown in the same manner as Basil. For garden culture and other species see separate article.

Catmint (*Nepeta Cataria* or *N. Mussini*).—For herbal culture see Basil, and for garden culture and other species see separate article.

Clary (*Salvia Sclarea*). — This with Catmint and Calamint is a herb of the Labiate Order. Its cultivation and treatment are practically the same as Basil.

Garden Mint.—The culture of this is similar to that of Peppermint, which see.

Hyssop (*Hyssopus officinalis*. Nat. Ord. Labiatæ).—This easily grown herb prefers friable soil, and is propagated by dividing roots in spring or by raising from seed in April.

Lavender (*Lavandula vera.* Nat. Ord. Labiatæ).—This is the source of Oil of Lavender. The herb is cultivated for its fresh flowering "tops," and is an easy plant to grow. It will succeed in any friable garden soil, and can be propagated by division in spring, or by cuttings of young wood set in free sandy soil under hand-lights in autumn, and planted out in spring in their permanent positions. These cuttings should be placed in well-prepared ground 12–15 ins. apart, in rows 3–4 ft. asunder. An ordinary soil will yield 600–1200 lb. per acre of flowering tops. The lavender bushes should be kept low and compact, and not allowed to run to straggling wood, to the detriment of the blossom and flower-bearing power of the plant. The beds should be remade every three or four years. Full crops can be taken from the second to the fourth year, but earlier or later than this they are not in finest condition. Lavender is one of those herbal crops which require to be grown, if for commercial purposes, on a rather extended scale.

Marjoram (*Origanum Marjorana.* Nat. Ord. Labiatæ).—A light, rich soil is required for this plant, which can be grown from seed or propagated by cuttings. Sow under glass in April, harden off, and plant out in May, 6 ins. apart each way.

Mint.—The culture of this is similar to that of Peppermint below.

Pennyroyal (*Mentha Pulegium.* Nat. Ord. Labiatæ).—Treat in the same manner as PEPPERMINT. It will grow in nearly any sort of soil. The oil of this herb has commanded from 7s. to 9s. per lb.

Peppermint (*Mentha piperita.* Nat. Ord. Labiatæ).—A perennial propagated by division of roots or by cuttings. Beds require remaking every second year. All mints will do well in a sandy soil if sufficiently moist, and can be grown on stiff loam or clay in damp meadows or paddocks, though they require to be kept clear of weeds. Cuttings should be taken when the shoots are about 3 ins. long, each with a piece of root attached. These should be laid in rows or shallow trenches about 9 ins. apart, leaving the green tops above ground. The herb is cut when in flower in August.

Rosemary (*Rosmarinus officinalis.* Nat. Ord. Labiatæ).—This is a shrubby perennial plant. The flowering shoots are the parts required. It can easily be propagated by cuttings, and does well in almost any situation, but succeeds best on somewhat light soils. The beds do not require to be remade.

Rue (*Ruta graveolens.* Nat. Ord. Rutaceæ).—A familiar kitchen garden perennial, which flourishes in any well-drained soil, but which succeeds best in soil of a chalky nature. It is used in homeopathy and by the herbalists, but would not repay for growing on an extensive scale in this country (unless some measure of protection were to be afforded to the British herb industry), since it flourishes wild all along the shores of the Mediterranean, and can be more cheaply imported. Rue can readily be propagated by cuttings struck in autumn or spring, and accorded the protection, for a short time, of a hand-light. The plants should be set about 15 ins. apart, and cut back from time to time. They last for some years. The fresh young shoots or "tops" are the part required, and should be cut and dried in July.

Sage (*Salvia officinalis.* Nat. Ord. Labiatæ).—A perennial which is liable to be destroyed by frost or damp. Plant in a sheltered position in well-drained soil, preferably of a calcareous nature. As close cutting is likely to injure the herb, propagate from seed sown in April, or from a few cuttings set in a cold frame in September. The plants should stand 2 ft. apart, and the beds be remade every three years. Frequent harvests of leaf can be taken.

Savory (*Satureia hortensis* and *S. montana.* Nat. Ord. Labiatæ).—Sow seed in shallow drills about 9 ins. apart in mid-April, thinning out seedlings to 6 ins. apart in the rows, and treat as for MARJORAM.

Spearmint.—The culture of this is similar to that of PEPPERMINT, which has already been given.

Tarragon (*Artemisia Dracunculus.* Nat. Ord. Compositæ).—This may be easily propagated by division of roots or grown from cuttings. It thrives in light, rich soil, but requires dividing and replanting each year in April if on damp or heavy land. It is a perennial herb, and is harvested in August or September.

Thyme (*Thymus vulgaris.* Nat. Ord. Labiatæ).—This is one of the sources of Thymol, and the plant needs a warm position as well as good soil. It is propagated by seed sown thinly under glass or by cuttings set about 1 ft. apart when transplanted to their permanent position. The plants require constant division to keep them rich and bushy. New beds should be made annually.

Woodsage (*Teucrium Scorodonia.* Nat. Ord. Labiatæ). — A fairly common plant growing in coppices and on hedgerows and hillsides which has pale yellow characteristically Labiate blossoms. We recommend it to the herb grower's attention. Treat as for SAGE.

A. B. T.

[For careful identification and description of all the wild and native Labiate herbs generally, see *Flowers of the Field*, by the Rev. C. A. Johns, or other similar botanical works.—EDITOR.]

POTPOURRI.

What is Potpourri? the uninitiated English amateur will ask, and in a word it may be said to be the essence of every delightful scent in a handy solid form. It is made in two different ways: by a dry method and a moist. The first is easiest and quickest, but by the moist process the result is better, sweeter, and more enduring.

In the dry method the Rose petals are completely dried; preferably on sheets of paper in an airy room. The Lavender and Sweet Geranium leaves and any other ingredients are also made quite dry.

In the moist process the material is only partly dried, so that it has a tough, leathery consistency; it is then put into a well-glazed jar, a good handful at a time, pressed down, and sprinkled with a salt mixture, consisting of equal parts of bay salt and common salt. The bay salt, which is sold in lumps, is roughly pounded, so that some of it is quite small and some the size of peas, and is mixed with the common salt.

Materials.—The usual materials for potpourri are—Rose petals for a good half or more of the whole bulk, sweet or scented Geranium, Sweet Verbena, Bay leaves, and Lavender. If a preponderance of Rose petals is secured the exact proportions of the rest do not matter; the supply is sure to vary from year to year. Anything may be added which has a lasting fragrance from possessing some kind of essential oil.

How to Make.—If the potpourri is made on rather a large scale it is convenient to prepare the different ingredients in separate jars. But everything is treated alike in being put into the jars, salted and pressed. The layers should be about ½ in. thick after pressing, and the salt over each layer should be enough to show evenly all over without actually covering. It is important that the Roses should be picked when free from rain or dew; they should be just full blown, but not overblown; the petals are picked off and separated, and laid out in a room to become half dry. No definite time can be given for this, but it usually takes from two to three days. The leaves of the Sweet Geranium are torn into strips, and take about as long to dry as the Rose petals. Bay leaves, Lavender, and Sweet Verbena have less natural moisture; they can go straight into the jars without any special drying. The material is not only pressed down in the jars as it goes in, but must also be weighted down by means of a wooden disc that nearly fits the inside of the jar, and a stone or other weight; the wooden presser may have to be in two pieces if the jar narrows at the neck. When all is ready, a mixture of spices and sweet gums is prepared; a suitable quantity for a bulk of two-thirds of a bushel would be: Mace, cloves, and cinnamon, half an ounce each; coriander, allspice, gum storax, and gum benzoin, half an ounce each, all pounded; and violet powder, a quarter of a pound. The prepared Rose petals will be found to be in close, flaky masses that must be carefully broken up by hand and well mixed up with all the rest and with the spice mixture. The same spice mixture is used for both kinds of potpourri.—G. J.

POTTING.

The ideal soil for potting is the top spit from good pasture land. It is usual to cut this in turves about a foot square, and from 2–5 ins. thick according to the amount of fibre it contains, and then stack them on slightly raised ground, grass side downwards. In six or eight months it will be ready for use, and may be chopped down with a spade. Second in importance is leaf-mould. It is impossible to have too much of this material in hand, as it mixes freely with the soil and lightens it, acting also as a mild manure, encouraging a healthy root action. Oak and Beech leaves make the best mould after they have decayed sufficiently to be passed through a sieve following a gentle chopping with a spade. Coarse and fine sand, together with old lime rubble, wood ashes, and charcoal, are always more or less necessary to make a good porous compost. Many of our brightest winter-flowering greenhouse plants come under the heading of hard-wooded plants. These must have peat; ordinary soil is no use to them, and anything in the shape of lime is fatal. For orchids also a special compost is required in the shape of sphagnum moss and osmunda fibre mainly. It is not intended here to go into details of compost, but the grower will naturally use his own judgment in this way. For very young plants and such as only produce very fine roots, as, for instance, primulas and winter-flowering begonias, he will use a compost finer in every case than he would employ in the final potting of chrysanthemums, tomatoes, and other vigorous-growing plants that will take a compost which can be got ready almost with the aid of a spade only.

Having got clean pots, see they are well provided with drainage. Broken pieces of pots usually provide this; and oyster shells are useful for very large pots. The use of bones, or anything similar, is not advisable, as they do not always achieve the desired object, frequently becoming rank and sour. One good piece of pot over the hole in the bottom of the pot is sufficient for the smaller sizes, but for 5-inch pots and upwards an inch deep of finer pieces will often be needed to ensure perfect drainage. As a rule the limit is reached with fine-rooted subjects, rather less being employed for those with a vigorous root action. Immediately over the crocks put a thin layer of the roughest of the compost in order to prevent the finer portions from being washed down, and impeding the free outlet of waste water; a handful of compost then slightly beaten down with a rammer will make it ready to receive the ball of the plant to be potted. To knock this out of its pot, turn it upside down in the left hand, and with the aid of the right give the edge of the pot a slight tap on the edge of the bench, when it will come away easily and intact, representing in a healthy plant a ball of roots. Remove the old drainage and the loose top soil, then gently place it in the centre of its new pot, care being taken not to bury the stem any deeper than before, and gradually fill in with the new soil, using the potting stick carefully as the work proceeds, until the pot is filled to within half an inch of the top. Some plants require a firmer rooting medium than others, and thus need a freer use of the potting stick; for instance, a sandy soil should be made firmer than a clayey one. Also certain plants require a very loose rooting medium; for instance, carnation roots will revel in a compost that would be almost fatal to a begonia so far as firmness goes. But it is almost safe to say where sturdy short-pointed growth is the natural habit of a plant when at its best, then it is a sure indication that firm potting is an absolute necessity. Never use a compost if it is too wet or too dry; to be just right it should merely hold together after being clenched in the hand. Over-potting above everything should be avoided, for this is the cause of more unhealthy plants than is generally realised. It is seldom necessary to use pots above two or three sizes larger than the one previously used. The aim should be to obtain a pot full of roots, and then to feed the plants, and not to endanger the health of even the most vigorous growers by adding too much manure in any form to the compost when potting. Watering a newly potted plant should be done with caution; give one thorough soaking, and no more till the pot rings clear when tapped with the knuckles. During hot weather never expose plants after their roots have been disturbed, to hot sunshine, for it unduly distresses them, and then it is that they are often killed with kindness, through a too free use of the watering-can. It is doubtful if there is anything connected with plant growing that calls for time and patience more than potting, for, unlike much of the other work that is daily necessary to produce healthy plants, successful potting does not, as we have just seen, allow of any slipshod methods or thoughtlessness. Patience alone makes a good potter—a fact all should remember.

F. T.

POTTING CACTI.—See *CACTI.*

POTTING DUNG.—See *COW MANURE.*

POTTING FERNS.—See *FERNS AND FERN GARDENING.*

POTTING ORCHIDS.—See *ORCHIDS: POTTING AND WATERING OF.*

POTTING SHED.

In the notes on *POTTING* no mention was made of the potting shed, for the reason that this important item can be better dealt with separately. No fixed rule can be laid down here as to the building, but generally speaking, the aim should be to erect it as near to the growing houses as possible, in order to facilitate working, and to prevent tender plants from getting chilled through having to be carried to and fro in the open. In drawing up the plans for a potting shed, there are a few things that it may be well to point out, as, if they are not in the plan, afterthought means more expense, even if they can be carried out then. Of course unsightliness, as far as possible, will be avoided in selecting the site, but should it have to be in a very exposed situation, then make preparations for having the walls covered with suitable climbers at the earliest opportunity. Allow plenty of working room inside, by having a good long bench down one side, and study the whole thing from a working point of view. Try to make everything as convenient as possible, for remember when this is done, one has gone a long way towards obtaining a speedy output. Potting plants, even in expert hands, takes up a lot of time, and the operator can only turn out a maximum day's work who has everything to his hand. Avoid having any steps at all if possible, for they are nothing but a nuisance and a time waster. In addition to side windows have a skylight immediately over the potting bench, as also artificial light in whatever way it is to be employed. Above all, have the doorway wide enough to admit the wheeling of a barrow or the carrying of a handbarrow, for nothing is more annoying than having to handle plants two or three times over for the sake of a narrow doorway. Some means of providing artificial heat will be necessary, not only for comfort in working, but in order that the soil may be a little aired during the cold spring months. If the shed is large enough, a corner might be reserved as an office, for there are countless things to be noted if one is to get the best out of our short seasons. Cupboards for the storing of seeds must not be forgotten, and shelves for pots and stakes more than pay for themselves. Let the bench be made strong, and capable of holding a few barrowfuls of soil; the benefit of this is always noticed during spring, by having soil at hand in a fit state to use. The same applies to stocks of leaf-mould, and well-rotted manure, which can always be kept under the bench. Other necessities, such as sand, charcoal, lime rubble, and crushed bones, together with broken crocks, should always be kept close at hand, for it is the finding of these things after starting potting that spoils a good day's work. Tools for potting with are not difficult to obtain; a piece of round wood, wedge-shaped at one end, forms the rammer; it can be made in various sizes to suit all kinds of pots; an ordinary hand hammer completing the necessary tools, which last is used for breaking up drainage material. Where many pots have to be used, a machine for washing them may well be included in fitting out a potting shed, for pots above everything should always be well cleaned before being used again. With a shed erected throughout on common-sense lines, there should be no time lost in needless running about, but to prevent rubbish and unnecessary stuff getting in the way during the busy season, it should be made the rule that a good clean up is done every day, since only by such means can a potting shed be prevented from becoming the lumber place one so often sees.

F. T.

POULTRY MANURE.

Poultry dung or fowl manure is an exceedingly useful material for the garden if properly used, but otherwise is a dangerous material to handle, as owing to its concentrated nature it is quite capable of poisoning one's plants instead of encouraging them to make fresh growth.

Much unnecessary waste goes on in the collection of poultry manure; the common practice is to sweep out the poultry-houses and throw the dung into a heap in the open and to use it as opportunity occurs for gardening purposes. After such a heap has had heavy rain on it much of the goodness has been washed out, the remainder being insoluble material of little garden value.

Drying Poultry Dung.—By far the better way is to collect all the sweepings and spread them out in thin layers in boxes or trays to dry, putting them in hot sun outside, and protecting them from rain, or put them in gentle heat indoors. They will then lose the water they contain, but the sun heat will not, and the indoor heat should not, be sufficiently great to drive off any of the ammonia they contain. When all the sticky nature has disappeared and the material falls to a fine dry powder it may be stored, preferably in tins with tight-fitting lids or well-covered barrels.

Using Poultry Dung.—Most crops are benefited by an occasional dressing of solid, or dose of liquid poultry manure. It is essentially a spring or summer fertiliser, suitable more especially for crops where leaf growth is required. For dry use it can be scattered on the ground at the rate of 4–10 lb. per sq. rod, and well hoed in. For use as a liquid manure one peck to each 80 gallons of water will be enough, and the liquid must be kept off the leaves.

Some Similar Manures.—Below we give a few notes on some of the lesser known manures which are more or less similar to poultry manure:—

Duck Manure.—This is suitable for all soils, but no great supplies are available. It is not usually considered a very rich manure, and may be applied at the rate of 15–25 lb. per sq. rod in the spring-time.

Goose Dung.—This is very similar to the above, and may be used in exactly the same way.

Guinea-fowl Manure.—This is almost indistinguishable from ordinary poultry manure, and thus the material can be used in the same way.

Partridge Manure.—Where many partridges are bred for shooting the amount of manure produced may be quite appreciable. It is not as rich as Duck Manure which we have mentioned above, and may be used at the rate of about 30 lb. per sq. rod, if put on about a month prior to sowing or planting. It is suitable for all soils.

Peacock Dung.—Few typically ornamental grounds would be complete without their strutting peacocks, and where there are several birds, the manure collected may, if saved up, become appreciable in amount. Up to the present it has been used for garden purposes to a very limited extent, but may be applied to vacant land a short time prior to planting in much the same way as poultry manure.

Pigeon Dung.—Sweepings from pigeon-cotes are very similar in appearance to sweepings from poultry-houses. If many birds are kept the amount of manure will be appreciable, and it should be dried and used in an exactly similar manner to poultry manure.

Seagull Manure.—Those gardeners who live at the coast where there are extensive cliffs may be able to get some of this manure, but consequent on its exposure to the elements it is comparatively poor, and up to 35 lb. of it may be safely dug in per sq. rod of ground in the early spring, or indeed even in the winter. Very little is available, as a rule, and where poultry manure is available this is not worth the trouble of getting.

Turkey Dung.—The manure produced by turkeys, especially when they are being fattened up for Christmas, is rich, and useful for garden purposes if applied in dry form at the rate of about 6 lb. per sq. rod in the spring before planting.

E.

POWDER FLASK.—See *Ornamental Gourds.*

POWDERS FOR DUSTING. — See *Spraying Mixtures and Fungicides.*

POWDERY MILDEW OF VINES.—See under Vine Mildew in *Diseases of Plants.*

POWDERY MILDEWS. — See *Mildews.*

POWDERY SCAB.—See under Corky Scab in *Potato Diseases.*

PRAIRIE BURDOCK (*Silphium terebinthinaceum*).—See *Silphium.*

PRAIRIE CLOVER.—See *Petalostemon.*

PRAIRIE GRASS.—See *Spartina.*

PRAIRIE ROSE (*Rosa setigera*).—See *Rose Species.*

PRAIRIE SUNFLOWER (*Helianthus rigidus*).—See *Sunflower.*

PRATIA (Nat. Ord. Campanulaceæ).—This is a useful little genus of dwarf-growing plants which can be used for the front of borders or on rockwork in warm spots outside, but are more suitable for rock garden culture indoors. They require a compost of peat, sand, and good loam, one part of each, and may be propagated in the usual way by seeds in the summer or root division in the spring. *Pratia angulata* is the hardiest species, but *P. begonifolia* and *P. macrodon* are also worth growing. The first and last species bear white flowers, the second blue, and the flowering period of all extends from May to September. The height averages 1–3 ins.

PRECIPITATED CHALK.—See CALCIUM CARBONATE in *LIME COMPOUNDS*.

PREPARATION FOR MULCHING.—See *MULCHING*.

PREPARATION OF FENCE SITES.—See *GARDEN FENCES*.

PREPARATION OF FRUIT FOR BOTTLING.—See *FRUIT BOTTLING AND PRESERVING*.

PRESTINARIA.—Now included in the genus *COREOPSIS*.

PRICES OF FRUIT TREES.—See *FRUIT CULTURE, HARDY: GENERAL CONSIDERATIONS*.

PRICKING OFF. — See *BEDDING PLANTS: CULTIVATION OF*. For PRICKING OFF CELERY see *CELERY*, and for PRICKING OFF ROCK PLANTS see *ROCK PLANTS FROM SEEDS*.

PRICKLY FIR (*Picea polita*).—See *TREES*.

PRICKLY IVY (*Smilax aspera*).—See *CLIMBING AND TRAILING PLANTS*.

PRICKLY PEAR (*Opuntia ficus indica*). See *CACTI*.

PRICKLY SHIELD FERN (*Aspidium aculeatum*).—See *FERNS AND FERN GARDENING*.

PRICKLY SPINACH.—See *SPINACH*.

PRICKLY THRIFT.—See *ACANTHOLIMON*.

PRICKLY-TOOTHED BUCKLER FERN (*Nephrodium spinulosum*).—See *FERNS AND FERN GARDENING*.

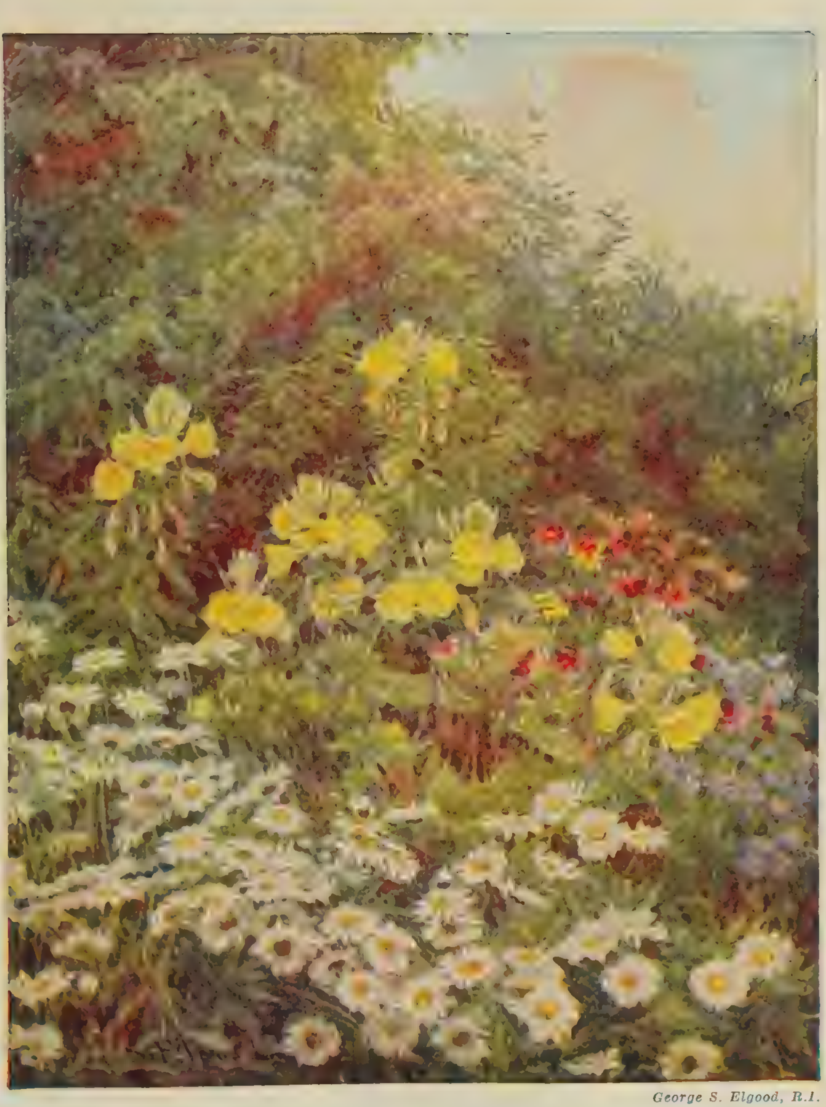
PRIMROSE. — See *PRIMULA* and *WATER GARDEN: PLANTS FOR THE*.

PRIMULA (PRIMROSE. Nat. Ord. Primulaceæ).—The genus Primula is of high value to the gardener, and comprises many plants of great beauty and variety. A large proportion are hardy, and many of those of a tender character are charming in the greenhouse and conservatory. Their ranks have been largely reinforced within recent years by numerous introductions from China and other parts of the world, but the old favourites still retain their hold upon the affections of the flower-lover. The introduction of new species has afforded a wide field for the seedling raiser and hybridiser, and a considerable number of hybrids, and varieties have been the result of his work. Within the scope of this publication it is impossible to give details of all the plants comprised in the genus. Many of them are, however, of little more than botanical interest, and others present great difficulties in keeping or cultivating them, so that those enumerated are only some of those which are readily amenable to cultivation, or possess special importance in other directions.

Culture.—In such an extensive genus, including plants from many parts of the world and growing naturally under the most diverse conditions, it is impracticable to give full details regarding every point, but it is convenient to divide them into several sections and to indicate the general requirements of each.

INDOORS.—The CHINESE PRIMULA, *P. sinensis*, has long been a favourite for greenhouse and conservatory cultivation, but the favour shown to *P. kewensis*, *P. malacoides*, *P. obconica*, *P. Sieboldi*, and others, has tended to reduce its popularity. It is, however, of high value, and, with the addition of representatives of the others, cannot be dispensed with for decorative purposes. In addition to these, some of the newer Chinese and Himalayan species are only satisfactory if cultivated under glass.

Seeds of these greenhouse Primulas should be sown in a gentle hotbed, or in pots or pans in slight heat, from March to June, in a soil composed of about two parts of leaf-soil, one part of loam, and one of silver sand. Put this through a sieve with a half-inch mesh, using the rougher material for the bottom of the pots above the drainage.


George S. Elgood, R.I.

EVENING PRIMROSE

The pots or pans must be well drained, and filled with the soil to about half an inch from the top. Sow the seeds very thinly, and just cover with fine soil. Water carefully, and cover the pots with a sheet of glass and a piece of paper to exclude the light. Examine daily to see that the soil is sufficiently moist. As soon as the seedlings begin to appear remove the glass and paper, and expose gradually to air and light. Keep the seedlings near the light, but shaded from the sun. Place the pots in a temperature of 50–60° F.; prick off the seedlings when they can be handled, and grow on in a slightly lower temperature. This treatment suits the varieties of *P. malacoides*, *P. kewensis*, *P. sinensis*, and others, but *P. Sieboldi* may be given a slightly lower temperature.

Almost all the hardy Primulas make excellent pot plants, but they should be grown in a cooler house, and should receive plenty of air at all times. For their happiness a low house where they can be kept near the light, with ample ventilation, is best. They generally do well in a structure from which frost is just excluded.

With Primulas grown in pots under glass, green fly and thrips are troublesome. Gentle fumigation and other treatment referred to under the proper headings should be attended to whenever these pests are observed.

OUTDOORS.—A considerable number of the species grow well in the flower border, and a large proportion, especially those which prefer moist places, are capital plants for the wild garden and the margin of streams and ponds. In the list of species the best for this last purpose are indicated. In all cases a free, well-drained soil is preferred, and even many of the moisture-lovers are resentful of stagnant moisture at their roots.

Few of them prefer dense shade, and where their requirements in the way of water can be supplied, they like full sun in most cases. These hardy species can be raised from seeds sown under glass and given practically the same treatment as that suggested for the greenhouse. The temperature for the seedlings should, however, be rather lower, and care must be taken that they do not become too drawn for want of air or light. In addition to propagation by seeds, division is suitable for many species. Few of these should remain more than two or three years without being divided when they have made suitable offsets. It is desirable to note that a proportion of these plants die down to an almost invisible crown in winter, and that great care must be exercised in working among them when they are at rest. In all cases they should be clearly marked with a peg or tally.

ROCK GARDEN CULTURE.—Hardy Primulas are indispensable in all good rock gardens. The European species are, as a rule, the best for rockwork, but for moist corners and at the base a considerable number of the others may be employed.

Some of them prefer to be grown in crevices of the rocks or, if on the level, jammed between two stones. Others are natives of pastures, and need to be cultivated on the level. In the absence of their natural carpet of greenery a mulch of grit and gravel of about half an inch thick will be highly beneficial. A number of these rock garden Primulas gradually rise out of the ground as the rootstock lengthens, and it is necessary to raise the soil about them to the level of the lower leaves or to lift them and replant them deeper, so that the lower leaves just touch the soil.

Key to the Selections.—In the selected list below those marked *B.* are suitable for the Border; *G.* for Greenhouse or frame culture; *H.H.* are nearly hardy; *M.* require moisture; and *R.* grow well on Rockwork.

Selection of Sorts.

Primula acaulis (Primrose).—Syn. *P. vulgaris*, which see.

P. admontensis (*R.*)—Lilac flowers in May. Height, 3–8 ins.

P. algida (*M.R.*).—Purple flowers in April. Height, 6 ins.

P. Allionii (*R.*). — Red-purple flowers in April. Height, 4–6 ins.

P. altaica (*B.R.*).—Altai Primrose, with mauve flowers in March. Height, 3–6 ins.

P. angustidens (*B.R.*).—Purple-lilac flowers in May. Height, 6 ins.

P. Arctotis (*R.*).—White or lilac flowers in May. Height, 6 ins.

P. Auricula. — See article on *Auricula.*

P. auriculata (*B.R.*). — Purple flowers in May. Height, 12 ins.

P. beesiana (*B.M.R.*). — Purple flowers in May. Height, 12 ins. *P. b. hybrida* is available in various colours.

P. biflora (*R.*).—Rose flowers in May. Height, 12 ins.

P. bullata (*R.*).—Yellow flowers in April. Height, 12 ins.

P. bulleyana (*B.M.R.*).—Bulley's Primrose, with yellow flowers in April. Height, 12–18 ins.

P. bulleyana hybrida (*B.M.R.*).—Various colours in April. Height, 18 ins.

P. calycina (Syn. *P. glaucescens*) (*R.*). — Purple flowers in May. Height, 3 ins.

P. capitata (*B.M.R.*).—Violet-blue flowers in April. Height, 6–12 ins.

P. carniolica (*M.R.*).—Lilac flowers in April. Height, 3–6 ins.

P. ciliata (*R.*).—Purple flowers in May. Height, 3–6 ins.

P. clusiana (*R.*).—Rose flowers in April. Height, 6–9 ins.

P. cockburniana (*B.G.M.R.*).—Scarlet flowers from May onwards. Height, 9 ins.

P. cockburniana hybrida (*B.G.*).—Various colours.

P. cortusoides (*B.G.R.*).—Rose flowers in May. Height, 9 ins.

P. denticulata (*B.G.M.R.*).—Various colours in March. Height, 9–12 ins.

P. denticulata cashmiriana (*B.G.M.R.*). — Various colours in March. Height, 9–12 ins.

P. elatior (*B.R.*).—Various colours in May. Height, 8–12 ins.

P. Facchinii (*R.*).—Rose-purple flowers in May. Height, 3–6 ins.

P. farinosa (*M.R.*).—Bird's-Eye Primrose, with rose-purple flowers in May. Height, 6 ins.

P. floribunda (*G.*).—Yellow flowers from March onwards. Height, 4–8 ins.

P. Forbesii (*G.*).—Rose flowers from March onwards. Height, 6–12 ins.

P. formosa (*B.R.*).—Pale purple flowers from May onwards. Height, 6 ins.

P. Forrestii (*G.R.*). — Yellow flowers in May. Height, 12–18 ins.

P. frondosa (*M.R.*). — Purple flowers from May onwards. Height, 2–6 ins.

P. glutinosa (*B.R.*).—Purple-lilac flowers in May. Height, 4 ins.

P. helodoxa (*B.M.R.*).—Yellow flowers in June. Height, 12–40 ins.

P. helvetica (*B.R.*).—Pink flowers in May. Height, 6–9 ins.

P. hirsuta (*B.R.*).—Rose flowers in April. Height, 6 ins.

P. hirsuta nivea (*B.R.*).—White flowers in April. Height, 6 ins.

P. integrifolia (*B.R.*). — Rose flowers in May. Height, 3 ins.

P. involucrata (*M.R.*).—Creamy-white flowers in April. Height, 6–12 ins.

P. japonica (*B.M.R.*).—JAPANESE PRIMROSE, with flowers of various colours from May onwards. Height, 12–24 ins.

P. Juliae (*B.M.R.*). — Violet flowers in April. Height, 2–6 ins.

P. Kerneri (*R.*).—Violet flowers in April. Height, 2–4 ins.

P. kewensis (*G.*).—Yellow flowers from April onwards. Height, 9–18 ins.

P. longiflora (*R.*).—Purple flowers in May. Height, 12–18 ins.

P. luteola (*R.*).—Yellow flowers in May. Height, 18–24 ins.

P. malacoides (*G.* or *H.H.*).—Pink flowers from spring onwards. Height, 12 ins.

P. marginata (*B.R.*). — Purple flowers in May. Height, 6 ins.

P. minima (*R.*).—Rose flowers in May. Height, 2 ins.

P. nessensis (*G.M.R.*). — Pink flowers from May onwards. Height, 6 ins.

P. nivalis of gardens.—See *P. hirsuta nivea.*

P. obconica (*G.*).—In various colours from spring onwards. Height, 12 ins.

P. officinalis (*B.*).—The COWSLIP, with various colours in April. Height, 12 ins.

P. Palinuri (*G.R.*).—Yellow flowers in May. Height, 6–10 ins.

P. Parryi (*B.*).—Purple flowers in May. Height, 6–18 ins.

P. pedemontana (*R.*). — Rose flowers in May. Height, 6 ins.

P. Poissoni (*G.M.*). — Purple flowers in May. Height, 15 ins.

P. pulverulenta (*B.M.R.*).—Red flowers in April. Height, 18–24 ins.

P. rosea (*B.M.R.*).—Rose flowers in March. Height, 6 ins.

P. saxatilis (*B.G.R.*). — Rose flowers in May. Height, 9 ins.

P. sibirica (*B.M.R.*).—Red flowers in May. Height, 6 ins.

P. Sieboldi (*B.G.R.*). — Red flowers in May. Height, 12 ins.

P. sikkimensis (*B.M.R.*).—Yellow flowers in May. Height, 18 ins.

P. sinensis (*G.*).—Various colours from spring onwards. Height, 12 ins.

P. spectabilis (*B.R.*).—Rose-purple flowers in July. Height, 4 ins.

P. Stuartii (*G.R.*).—Yellow flowers in May. Height, 9–18 ins.

P. Sturii (*R.*). — Rosy-purple flowers in April. Height, 3 ins.

P. suffrutescens (*R.*).—Rose-purple flowers in April. Height, 12 ins.

P. tyrolensis (*R.*).— Rose-lilac flowers in May. Height, 2 ins.

P. variabilis. — See article on *POLYANTHUS.*

P. Veitchii (*B.R.*).—Rose-purple flowers in April. Height, 12 ins.

P. venusta (*R.*).—Purple flowers in April. Height, 12 ins.

P. Venzoi (*R.*).—Pale-purple flowers in April. Height, 6 ins.

P. veris.—See *P. officinalis.*

P. verticillata (*G.*).—Yellow flowers from spring onwards. Height, 12 ins.

P. villosa (*R.*).—Lilac or rose flowers in May. Height, 6 ins.

P. vincaeflora (*R.*).—Purple flowers in May. Height, 12 ins.

P. viscosa (*R.*). — Red-violet flowers in May. Height, 2–7 ins.

P. vittata (*M.*). — Pink-purple flowers in May. Height, 12–24 ins.

P. vulgaris.—See PRIMROSE in article on *WATER GARDEN: PLANTS FOR THE.*

P. Wilsoni (*R.*).—Purple flowers in April. Height, 18–24 ins.

P. Winterii (*G.R.*). — Mauve flowers in May. Height, 9 ins.

S. A.

UP-TO-DATE SELECTIONS.

Primula acaulis Double Red.—Red.

P. a. Downshill Bluebird.—Violet-lavender.

P. a. Downshill Cambridge Blue.—Blue.

P. a. Downshill Plum.—Mauve.

P. a. Killarkin Blue.—Blue.

P. a. Royal Postillion.—A beautiful kind.

P. cernua.—Violet. Half-hardy.

P. encyclia.—Violet-rose.

P. Forbesii rubra.—Crimson, white eyes.

P. heucherifolia.—Rose-magenta.

P. hybrida Red Hugh.—Red.

P. intermedia.—Purple.

P. japonica Tyrian Red.—Red.

P. latisecta.—A very fine form.

P. Lissadell Hybrid Red Hugh.—Red.

P. malacoides Brightness.—Pink.

P. m. Golden Eye.—White and yellow.

P. m. King Albert Improved.—Rose.

P. m. Princess Mary.—Rose-pink.

P. m. Rosalind.—Mauve-rose, yellow centre.

P. m. The Prince.—Lilac and primrose.

P. Menziesiana.—Blue-violet. Scented.

P. microdonta alpicola.—Creamy-yellow. A scented bog garden sort.

P. microphylla.—A first-class kind.

P. ninguida.—Purple, tube yellow.

P. obconica Large-Flowered.—Several shades.

P. o. grandiflora Giant Eureka.—Carmine-rose and yellow.

P. o. Eureka Giant Hybrids.—Good colour range.

P. o. Giantea.—Many colours.

P. pubescens alba.—White.

P. pulverulenta Bartley Variety.—Red and pink.

P. rosea Brookhurst.—Rose-pink.

P. Runnymede Gem.—Double lilac-mauve.

P. sinensis Blue.—Blue.

P. s. Giant Coral.—Red, green eye.

P. s. Holborn Crested Pink.—Pink.

P. s. King Edward.—White.

P. s. Prize Double.—Many colours

P. s. Prize Single.—Many colours.

P. s. Double Sutton's Purity.—White.

P. s. Double Carmine.—Carmine.

PRIMULA VERA LEAF SPOT.—See *DISEASES OF ROCK PLANTS.*

PRINCE ALBERT'S FIR (*Tsuga mertensiana*).—See *TREES.*

PRINCE ALBERT'S YEW (*Saxegothea conspicua*).—See *TREES.*

PRINCE OF WALES' FEATHERS.—A name applied to *CELOSIA*, which see.

PRINCE'S FEATHER (*Amarantus hypochondriacus*).—See *LOVE LIES BLEEDING.*

PRIONOPSIS.—Now included in the genus *APLOPAPPUS.*

PRIVATE GARDENS: LETTING OF LAND FOR.—See *GARDENING LAW.*

PRIVATE SERVICE: WOMEN AND.—See *WOMEN GARDENERS.*

PRIVET.—See LIGUSTRUM in *SHRUBS.*

PRODUCTION: How to Increase on Allotments.—See *INCREASED PRODUCTION ON ALLOTMENTS.*

PROPAGATING FERNS.—See *FERNS AND FERN GARDENING.*

PROPAGATING FRAMES.—See *GARDEN APPLIANCES.*

PROPAGATING PYRETHRUMS.—See *PYRETHRUM.*

PROPAGATION OF CACTI.—See *CACTI.*

PROPAGATION OF CARNATIONS.—See *CARNATIONS.*

PROPAGATION OF CHRYSANTHEMUMS.—See *CHRYSANTHEMUMS: CULTIVATION OF.*

PROPAGATION OF FLORISTS' FLOWERS.—See *FLORISTS' FLOWERS.*

PROPAGATION OF HEATHS.—See *HEATHS.*

PROPAGATION OF PANSIES.—See *PANSY: CULTURE OF.*

PROPAGATION OF PERPETUAL FLOWERING CARNATIONS.—See *CARNATION: THE PERPETUAL FLOWERING.*

PROPAGATION OF PLANTS.

While the majority of plants are readily increased from seed, this is by no means the quickest method of reproduction. Some seeds require just as much care in sowing as fern spores, more particularly the finer seeds such as those of Gloxinias and other gesneraceous plants, also Begonias, and many species of Orchids. These, and many others, must be sown practically on the surface of a very fine soil or other suitable medium; for example, some Orchids, *e.g.* Cattleyas, are sown on living sphagnum moss. Some seeds again, such as Cannas, are so hard that they require to be soaked in hot water for several days in order to soften the seed-coat. Other seeds, *e.g.* those of Nelumbium or Sacred Lily of the Nile, are so hard that the shell is usually filed in order to facilitate germination. The whole question of propagation from seeds is, however, dealt with in a separate article on *Seed Sowing.*

Cuttings.—The more usual method of propagation practised in gardens is that of inserting cuttings of the parent plant in a suitable rooting medium. Some cuttings do not strike or root so freely as others. Much depends upon the hardness of the wood, the medium in which they are inserted, and also the temperature of such medium, whether it be soil, sand, cocoanut fibre, or even water. The chief advantage of increase from cuttings is that a fully-developed plant is obtained in a much shorter time than when seeds are sown, while not only is the resultant plant often stronger, but its character is usually preserved. As would naturally be expected, there are a great many variable conditions which contribute towards success or failure. Cuttings taken from semi-aquatic plants such as watercress, throw out roots in abundance whenever placed in a moisture-laden soil; whereas cuttings of other plants, whether soft or hard-wooded, would soon perish under similar treatment. Cuttings of succulent cactaceous plants such as Cereus, Mamillaria, Opuntia, etc., root more readily when placed in dry sand and exposed to hot sunshine. The propagation by cuttings of many hard-wooded trees and shrubs is attended by numerous failures, while much of the success obtained is due to the experience of the propagator in knowing under what conditions to select the cuttings, not only as regards season, but also with regard to the ripeness and hardness of the wood. Cuttings of soft-wooded plants generally require a much higher temperature, combined with a closer atmosphere, than that to which the parent plant has been accustomed, as this atmosphere prevents excessive transpiration, while the higher temperature both of soil and atmosphere encourages root action.

Callus is a word often used in reference to the rooting of cuttings, and refers to an exudation of the sap which circulates actively between the wood and the bark in all dicotyledonous plants. This sap gradually hardens to the consistency of rubber under certain conditions, which formation is less prominent in the case of soft than of hard-wooded cuttings. The callus produced in woody cuttings often thickens and hardens to such an extent that young roots are prevented from penetrating it, with the result that it has to be notched with a knife, and the cuttings subjected to increased bottom-heat before an adequate number of roots are developed. Many leafy cuttings such as Zonal Pelargoniums, are lost each spring by "damping off," a condition which is even more prevalent in the case of such cuttings as are of necessity confined to close frames. Damping can usually be checked by paying careful attention to ventilation. It is found that those exotics composed of firm wood, and which are of active growth, take longer to produce roots, and therefore require liberal ventilation, while if increased heat is applied with the object of forcing root growth, such action will often prove fatal, growth in this case being suddenly arrested. While the cuttings of many tropical plants can only be induced to make roots when the pots containing them are plunged in a hotbed, or beds of fibre subjected to bottom-heat, the majority of cuttings do not require to be plunged, and hard-wooded cuttings, including those of coniferous plants, require no bottom-heat. Cuttings of Conifers are usually selected from the terminal shoots of the branches during early autumn, at which season the sap is less active, and therefore the growths are soft. They are generally inserted in shallow pans of sandy soil, and covered with bell-jars or hand-lights.

Cuttings of plants such as Callicarpa, Capsicum, Rivina, Solanum, and many others of similar character, are best inserted early so as to ensure them flowering during the summer, and ripening their fruits in autumn.

When putting in cuttings of variable character, or where, as in Geraniums (*i.e.* Zonal Pelargoniums), some of the wood is quite soft, and that from other plants firm and hard, the two kinds should be kept separate. The harder cuttings are not so liable to damp off, and the wood, being fairly mature, roots freely, while the softer wood is very apt to rot, especially if the cuttings are watered immediately after being placed in the soil. To lessen the risk of decay it is advisable to allow the soft, sappy cuttings to wither for a day or so before placing in the soil, or, if inserted immediately they are removed from the parent plant, and trimmed, no water should be given until the second or third day.

LEAF CUTTINGS.—Leaves, being composed of tissues similar to those of the stem, admit, in some instances, of being used as a means of increase. *Begonia Rex* forms an excellent illustration of how leaves may be utilised in this way, while there are many other plants such as Bertolonia, Echeverias, Peperomia, Streptocarpus, etc., which may be similarly reproduced from leaves. Fully matured leaves must be chosen, these being pegged down on a bed of cocoanut fibre, or loamy soil, and sufficient bottom-heat provided to encourage root action. The larger mid-ribs of the leaf are severed with a knife, and it is at these incisions that a callus is formed from which the roots are emitted, little plants finally making their appearance.

VARIOUS CUTTINGS.—Then, again, we come across many plants that may be freely propagated from cuttings or sections of the root, as is commonly practised in the case of Seakale, but there are many others, among which the apple, pear, quince, rose, and whitethorn may be mentioned.

Difference in treatment is mentioned in case the beginner or inexperienced imagine that all cuttings can be treated alike. Carnations are often difficult to root from cuttings or "pipings," and it is largely on this account that they are layered. To facilitate rooting a common practice is to cut the stem long-ways to half an inch in length, thereby exposing a large surface of tissue to the soil for root formation.

In propagation of bush fruits from

cuttings, such as currants, gooseberries, etc., which are rooted in the open ground during the autumn, it is always advisable to put them out soon enough, as if left too late in the year the soil becomes cold, in which case they are not likely to become established before the spring, or until such time as the soil gets warm again.

Almost any plant may be propagated by cuttings if properly treated, and those who are accustomed to the habits of plants can usually tell how best to set about this form of increase. Decorative greenhouse plants, *e.g.* the Bouvardia and Pelargonium, may also be propagated from root cuttings, but as stem cuttings give stronger plants the former method is not generally adopted.

General Hints on Cuttings.—In practice it is found that cuttings root much more freely when in contact with the sides of the pots, so instead of setting two or three in the centre of a large pot, insert several round the edge of a small one.

When inserting cuttings see that the pots or boxes are well supplied with drainage, for which purpose potsherds of various sizes are generally used, over which a layer of decayed turf is placed, before the finer soil is added. Finally, a layer of silver sand or well-washed road grit is placed on the surface. With a wooden dibber make a hole sufficiently large to allow the cutting to enter the soil without force, see that the base of the cutting rests on a firm bottom, and if a little grit or sand is dropped into the hole before the insertion of the cutting, this will often prevent the newly-cut surface from rotting, and very much hasten the formation of roots. This is a small detail, but, nevertheless, a very important one. If cuttings are placed so loosely in the soil that they can easily be pulled out, there is little likelihood of their taking root.

Layering is a method of propagation largely practised in the case of those plants which are difficult to root from cuttings, and is commonly adopted by nurserymen when raising such plants as carnations, clematis, laurels, rhododendrons, vines, and many others. There are many modifications of layering, known as ringing, tonguing, twisting, wiring, etc.

The very fact of a stem or branch coming into contact with a moist soil is often sufficient inducement to that particular part of the plant to emit roots. Usually, however, a slit is made half-way through the stem in an upward direction, and the cut surface kept apart by means of a small piece of stone or wooden peg to prevent the wound closing and healing, and to admit of a greater number of roots being formed.

When layering it is usually advisable to remove from the shoot those buds not required to form stems or branches, after which the layer is pegged firmly in position and covered with soil. Should the portion protruding from the soil be considerable, staking will be necessary, as, if the layered shoot is allowed to rock in the wind, root action will be impeded.

Ringing, or the removal of a circular band of bark, is often done as a means of arresting the downward flow of sap, with the result that a callus is formed and roots put forth as in the case of cuttings. Ringing is preferable to twisting or wiring the stem. The twisting of branches or stems of many trees and shrubs previous to layering greatly facilitates rooting, but the practice is not a wholly desirable one, as the twisting damages the tissues to such an extent that the plants may become cankered. It is evident that plants possessed of either hard, or extremely soft and brittle stems, cannot be treated in this way, and in their case wiring, or what is sometimes called strangulation, is often resorted to, as in the case of those hard-wooded plants which are difficult to propagate from cuttings or by layering. A piece of wire drawn tightly around the stem checks the downward flow of sap. The large amount of woody tissue which collects in consequence very soon emits roots, provided that the thickened band is pierced here and there with a skewer. If exposed to a dry atmosphere and kept surrounded by a pad of damp sphagnum moss, or embedded in soil by splitting a small flower-pot in halves and rejoining these around the stem, roots soon form. This is often practised in the rooting of the tops of Aralias, Dracænas, *Ficus elastica*, and plants which make a similar growth. In all such modifications of rooting the physiological conditions remain identical.

Procumbent, or climbing plants, such as *Hoya carnosa*, Ipomoea, Lapagerias, and endless others, are restricted to a serpentine method of layering, the stem being made to dip down at intervals into the soil, each lower curve being tongued and held in position by means of a wooden or wire peg. Roots are freely given out at the joints or nodes, and each section, after being severed, with roots attached, then constitutes a new plant.

Those readers who have visited or worked in fruit nurseries will have seen large numbers of currants, gooseberries, quince, and other plants retained as a means of providing stocks for grafting, made to produce a large number of rooted cuttings by having their shoots or seems notched near the base. If the centre of the bushes are then filled up with soil throughout the late autumn and winter, the majority of the semi-detached shoots will take root. This method is generally referred to as ***mound-layering***.

Nature provides many illustrations of propagation other than that of scattering the seeds over the soil. It will have been observed that many plants throw out suckers from the base of the parent plant, as in the case of raspberries and other species of Rubus. Plums and many other stone fruits will also develop suckers in profusion, which last may be removed and transplanted as stocks upon which to graft other varieties. This, however, is not always a wise plan, as plants so raised are apt to produce suckers later in life much more freely than stocks raised from seedlings.

Grafting.—Scientific research has brought much to the notice of the practical cultivator, and by a careful study of plant life, ways and means of propagation have been suggested which at one time would have been considered impossible. Grafting and budding are perhaps the most important methods of increase. The chief advantages claimed by these methods are to economise time, as for example, in the case of many fruits the grower would have to wait some years before the trees arrived at a profitable age, whereas when grafted on dwarfing and more fibrous rooting stocks the excessive vitality of the plant is checked, with the result that fruit buds are readily formed. Thus the whole habit of growth of the plant becomes altered, a condition which is well demonstrated where apples are grafted on the

Paradise Stock, or pears on the Quince Stock. Again, if we take the case of roses, these, if growing on the wild briar or Dog-rose, make a vigorous growth, and are not well adapted to the lighter and shallower soils, but when grafted or budded on the French briar of less robust root action, plants suited to these shallower and lighter soils are secured. Like apples on the Paradise Stock and pears on the Quince Stock, roses have not the longevity when placed on the Manetti or less robust rooting stocks; in each case fertility and fruit production is obtained much earlier. Budding and grafting admits of many plants being increased in very large numbers and in a short space of time, when it would be difficult to root from cuttings or propagate in any other way.

By either budding or grafting we are able to grow certain plants on soils and in climates which, under ordinary circumstances, would be quite unsuited to their growth. As an example of this it is found that peaches succeed very well in heavy, tenacious soils when grafted on certain varieties of Plum Stocks. So great is the variation in some cases, that we have known pears intended to be grown on light soils to be grafted on the Mountain Ash, but these are exceptional cases which need not be enumerated as they are so seldom practised. As a rule, plants having similar physiological characteristics unite freely, mere relation with regard to genera or species often serving as little guide to the propagator. Often, while no difficulty may be presented in securing a union, the results so produced are anything but satisfactory from a commercial point of view, and prove a disfigurement to the tree. It may be noticed in peaches that very often the stem of the scion or graft is altogether out of proportion to that of the stock. There are many forms of grafting, each depending upon the difference of diameter between the scion and the stock; but in every case it is necessary to bring the cambium layer of the scion in contact with that of the stock.

To ensure success the stock should be reasonably dormant, or just about to be active, when the scion is inserted, and to obtain this condition it often becomes necessary to retard the growth of the stock by heading it back early in the year before the sap begins to flow. Care must also be taken in seeing that the grafts are not too forward or in excess of the growth of the stock. Some pears burst into bud very early in the season, and therefore it becomes necessary to place in a cool situation and completely cover them with soil until such time as required for grafting. When the graft has been placed in position it is necessary to keep it there by tying securely with grafting wax, of which there are many preparations made of pitch, resin, beeswax, and turpentine, although some nurserymen still use a mixture of very plastic clay, with which is incorporated some well-spent cow-manure to prevent the clay from cracking. The object of the covering is to guard against the drying effects of air and sunshine.

Of the different modes of grafting, that known as WHIP- or TONGUE-GRAFTING is most generally employed in treating with hardy fruits. Needless to say when the stock and scion are of equal diameter a perfect union takes place, but where the scion is of smaller diameter as compared with that of the stock, it is necessary to ensure that at least one side of the cambium layer of the scion coincides with that of the stock, otherwise no union will be effected. The advantage of the tongue to the scion is that when placed in a corresponding cleft in the stock the two are kept in position.

NOTCH-GRAFTING is resorted to when the diameter of the stock is three to five times greater than that of the scion; a notch-like incision is made in the stock, while the scion is shaped after the manner of the piece removed from the stock, on to which it is then fitted.

CROWN-GRAFTING is adopted in the case of very large trees, as it not unusually happens that after ten years' or so growth, some varieties of orchard trees are found to be unfruitful in the district in which they are growing, and rather than sacrifice the whole tree, it is much simpler to cut back the leading branches and insert grafts in each branch. To perform this successfully the bark is merely cut to the length of an inch or so, and slightly raised to admit of the graft being pushed home between the bark and the wood. The graft only requires to be cut in a sloping direction, as practically the whole of the cut surface is exposed to the sap rising in the larger branches. In the case of one failing, two scions are usually inserted, the wound being well covered with wax. There are many other methods of grafting, such as splice-grafting, side-grafting, saddle-grafting, etc.

INARCHING is a term applied to a form of grafting wherein the scion is only partly severed from the parent plant, and is therefore dependent upon it until such time as a union is effected. In gardens and nurseries very many plants are increased by grafting. All the variegated ivies are grafted on the commoner species, and similarly the more delicate and tender varieties of Clematis are grafted on the roots of the stronger species, namely, *Clematis Vitalba*, or Traveller's Joy, of the woods, which possesses a very robust constitution coupled with strong root action.

Budding, or to be more correct bud-grafting, is only another modification of grafting. The chief distinction is that a dormant bud, with a small piece of wood or bark attached, is transferred to the stock when the latter is in a more advanced stage of growth, the operation usually being accomplished throughout the months of July and August. The operation, when applied to the many varieties of stone fruits, calls for some dexterity before efficiency is attained. As in all cases of grafting a very sharp knife is essential, for if the delicate rind of the bark is bruised this may cause failure.

If we take as an example the budding of a briar, we will assume that the briar has been planted in November; in the spring a few buds break from near the extremity of the plant, three of which are selected or allowed to continue their growth. Just previously to being budded these are shortened back to within a foot or so of the main stem; the reason for doing so being to prevent the elaboration of the sap at the ends of the branches or growing points. Dormant buds are removed from the variety of rose it is intended to increase, and transferred to the stock. For the reception of the bud a T-like incision is made on the shortened-back branch, on the underside for preference, the closer to the stem the better. A portion of wood will be attached to the bud which was removed, and this is better disposed of by jerking it out with the point of the budding knife, but if it does not come away freely it had better not be unduly forced. Holding the bud by the stem of the leaf raise the bark at the incision, as this will admit of the point of the bud entering without undue pressure. It can then be gently pressed into position. Now bind the bud in position with raffia, but apply no grafting wax. As with all similar operations, a little practice is needed before efficiency is attained.

Having inserted a bud on each branch, nothing now remains but to allow the briar to make what growth it chooses. The buds, if they take properly, will remain dormant throughout the summer and winter, and will be well nourished. In the following spring they will show signs of starting into growth, and to facilitate this cut back the length of briar above the bud; this will have the effect of stimulating the bud, due to a larger supply of sap. During the summer the head of the briar is composed of the growth resulting from these buds, which becomes well matured, flowers, and is pruned back in the ordinary way at the winter pruning. As with grafting, there are several different methods of budding practised, such as flute- and shield-budding, but after all the principle is the same throughout.

We must mention the advisability of shading the buds after insertion during excessively hot weather, and this may be done by placing a cabbage or rhubarb leaf on or around the stem on which the bud has been placed. Grafts or scions are often placed on the root, which operation is known as ROOT-GRAFTING, but buds are rarely ever placed so low down.

Division of the Roots.—Another means of propagation not yet mentioned is by means of division of the rootstock. This is very simple, inasmuch as it only consists in dividing up the plant by means of a spade, a sharp knife, or by pulling the various fibrous-rooted plants asunder. Flowers of the herbaceous border are largely increased in this manner.

Various Methods. — Clumps of Rhubarb in time become very large and exhausted, therefore they have to be divided, and the sets or offshoots planted in newly prepared and manured soil. Bulbs and tubers require quite another treatment. All true bulbs may be propagated by scooping out the base of the central bulb, or in such a way as to cause it to develop lateral buds or bulbils at the base of the scales. Bulbs of lilies, such as *Lilium auratum*, may be increased by removing the matured scales and pricking them out into boxes of sandy soil. Many bulbs—such as Crinums, Narcissi, and Tulips—divide or develop offsets from the base, and in this way present a ready means of propagation. Corms, as in the Crocus, multiply readily from buds which grow into corms and supplant the older ones. Caladiums and many other varieties of Aroids are propagated from eyes which are developed over the upper side of the corm.

A study of the plant will usually present many suggestions for propagating or increasing it. For example, in the Strawberry, where runners are developed in abundance from the parent plant, or again, on those plants like the Iris and many ferns of the Davallia type which increase by rhizomes. Where portions of a plant are removed without roots, they are all the better for being shaded and the atmosphere kept moist, as it is useless to water the pots containing the cuttings and sections of the plant until the roots appear. In the same way when increasing tuberous-rooted Begonias, it is very preferable to start the cut tubers by laying them on a bed of moistened cocoanut fibre until the roots show signs of development. The development of roots may readily be noticed where potato tubers are placed in trays to sprout. There is usually enough moisture and food in the tuber to provide all that is necessary for growth up to a certain stage. A careful observer and student of nature will usually become an efficient propagator of plants, as he will carefully study the habits of each plant that comes under his observation.—J. C. N.

PROPAGATION OF RHODODENDRONS.—See *RHODODENDRON.*

PROPAGATION OF TULIPS.—See *TULIPS.*

PROPAGATION OF VIOLAS.—See *VIOLA.*

PROPAGATOR. — See under PROPAGATING FRAMES in *GARDEN APPLIANCES.*

PROPHET FLOWER (*Macrotomia echioides*).—See *MACROTOMIA.*

PROSAPTIA.—Now included in the genus DAVALLIA, for which see *FERNS AND FERN GARDENING.*

PROTECTING PLANTS: MODES OF. Many of our favourite perennials, such as Delphinium, Galega, Geum, Pyrethrum, etc., are liable to suffer from the frost if in exposed positions. There are several modes of protecting these plants, some of which are mentioned below.

There is no doubt to my mind that the best way, if such is practicable, is to fork up the more tender perennials, and plant them in October in coke-dust ground moderately fine, in an old frame. The plants are packed rather close together, and labels put in at the bottom of such rows as are formed. Then in cold weather an old light or two may be thrown over the frame, or even mats without the lights, and such protection will be found quite sufficient under ordinary circumstances to prevent damage.

It is very provoking to lose a number of one's plants during frost; but some will say that the method just described is not worth the trouble, and indeed it is often inconvenient to disturb the plants. But their positions may be roughly gauged by placing sticks where the plants were forked up, and a method such as this enables those parts of the border to be properly dug over and manured.

Another method which finds great favour with some, is to cover the roots and crowns with material of one kind or another. This material may be cinder-ash, leaf-mould, strawy-manure, or even pieces of matting. I do not advise the use of manure, since the liquid made by the rain soaking through is most likely to corrode the roots. Pieces of matting may be used if desired, but I would rather use leaf-mould or cinder-ash. Straw might be used if made compact and firm.

If leaf-mould or cinder-ash be used, build up a mound over the crown, and let the crown be covered several inches deep. Arrange the material with sloping sides so that the rain will run off, and make it fairly firm. Do not do this so long as the weather keeps open and moderately dry, and so long as there are no sharp frosts. Rake off the material in early March, for the plants will be starting to grow. The leaf-mould may then be forked in, but the cinder-ash had better be collected and removed as it will do no good.

Such plants as the *Chrysanthemum maximum*, Doronicum, Erigeron, and perennial Sunflowers need not have this care bestowed upon them. It would be sheer waste of labour, since such strong kinds of plants are quite able to take care of themselves in any average winter.—E.

PROTECTION OF SEED BEDS.—See *TREES: RAISING FROM SEED.*

PROTECTIVE TISSUES.—See under TISSUES in *PLANT PHYSIOLOGY.*

PROTEID-SYNTHESIS. — See under FOOD SYNTHESIS in *PLANT PHYSIOLOGY.*

PROTOPLASM.—Notes on this living substance will be found in *PLANT PHYSIOLOGY.*

PROVENCE REED (*Arundo Donax*). See *ARUNDO.*

PROVENCE ROSE (*Rosa gallica provincialis*).—See *ROSE SPECIES.* For the best varieties see *ROSE CLASSES.*

PRUNELLA (SELF-HEAL. Nat. Ord. Labiatæ).—This is a small genus of dwarf plants suitable for the rock garden or rock border, or for edgings to the perennial border, the medicinal value of which has fallen into disrepute. They are of very easy culture, and may be propagated by dividing the roots in the usual way in the spring. *P. grandiflora,* and its variety *rubra,* are the sorts most often grown. They bear blue and red flowers in July and August. *P. laciniata* (Syn. *P. alba*) is the best white species. *P. vulgaris,* and its varieties *laciniata* and *rubra,* all known as the COMMON SELF-HEAL, are hardly worth growing. The height of all the species rarely exceeds 6 ins.

See also *MEDICINAL HERBS.*

PRUNIER DE ST. JULIEN (*Prunus communis juliana*).—See *TREES.*

PRUNING CLIMBERS.—See *CLIMBING AND TRAILING PLANTS.*

PRUNING FRUIT TREES.

The method of pruning fruit trees must be governed or determined by the form the tree is intended to assume, and by the nature of the tree itself according to habit and inherent peculiarities. Apples, Pears, Plums, and Sweet Cherries fruit on spurs, and may be pruned accordingly; but a few Apples produce the best fruits at the end of shoots, and these should be preserved till the fruits are gathered at least. Apricots, Morello Cherries, Nectarines, and Peaches fruit all along the length of the previous year's shoots, and these must be left full length, regulating the pruning by thinning out the old shoots, and by disbudding in early summer.

Standard Trees.—These should be pruned in the early stages of growth to get eight to twelve leading branches to form the head of the tree. The first year only three shoots at regular distances apart should be allowed. At the winter pruning cut these back to 12 ins. Several shoots will arise from them the following summer, but all except the two best placed on the primary shoots should be stopped at an early stage of growth. If these six are shortened to 12 ins. again in winter, two more from each should be allowed to grow, and this will give twelve leading branches, which will be enough to form the head of the tree. After this, standards and half-standards should be allowed to grow naturally, merely regulating the head by thinning out shoots where crowded and cutting away all dead wood. Always prune just above a bud pointing in the direction the shoot is desired to grow.

Pyramid Trees.—These are best suited for Apples and Pears, and the essential feature of them is that they should have a central, upright stem or trunk. The branches should be longest at the base of the tree, and gradually become shorter towards the top of the tree. When newly planted, the necessary pruning should be given to keep the tree in form and every year afterwards. First remove the shoots that cause crowding, then shorten back all growths one-third of their length. Some may require a greater length to be removed and others less, to maintain the shape of the tree, and this must be done with discretion.

Bushes.—If a start is made with a maiden tree, cut back the main stem to 12 ins. from the ground. In the second year aim at getting a bush open in the centre, with all branches regularly disposed. Thin out those that cross one another, and shorten the remainder one-third of their length, cutting above a bud in each case pointing in the direction that succeeding growth should take, to form a bush with branches extending in every direction, at equal distances apart. Apples, Plums, and Sweet Cherries are suitable for this form of tree.

Espaliers.—The branches of trees in this form of training must be fastened up horizontally to wires trained between two stout end posts, or to wooden spars fixed horizontally on upright posts, 6–8 ft. apart. Trees already partly trained can always be procured from the nurseries, but maiden trees can be planted and trained by the grower. Cut back the maiden tree to 9 ins. from the ground, so that the first pair of side branches will have a rise of 3 ins. before being tied down horizontally to the wires or other supports. During the following winter prune back the leader to 12 ins. and shorten the side branches one-third their length if strong, or to one-half if weak. In succeeding winters cut back the side-shoots of the branches to 1 in. and shorten the leader and all side branches as before, and so on till the espalier is covered.

Wall or Fence Trees.—Apples, Apricots, Morello Cherries, Nectarines, Peaches, Plums, and Sweet Cherries all succeed best when trained in the fan shape. Pears should be trained horizontally, or as oblique cordons, at an angle of 45° on walls or wooden fences. The leaders of Apples, Pears, Plums, and Sweet Cherries should be shortened to 12 ins. every winter, to provide for successive pairs of side branches and a new leader. All side-shoots should be shortened to 1 in. to form spurs. If summer pruning is adopted, shorten all side-shoots to four or five leaves, between the end of July and the end of August, but further shorten them in winter to two or three buds. The winter pruning may be done from the time the leaves fall till the end of February, but not in frosty weather.

Apricots, Morello Cherries, Nectarines, and Peaches always produce far more shoots than can be laid in at 4 ins. apart, and should be disbudded when the young shoots are only 1–2 ins. long. Leave two young shoots at the base of the fruiting ones, and one at the apex. This is generally sufficient to furnish enough fruiting wood for the following year, but discretion or judgment should be exercised in case old branches have to be covered with young shoots. After the fruit is gathered, some or all of the fruiting shoots may be cut out, and the trees otherwise regulated to prevent crowding. This, of course, could be done in winter, preferably not later than the beginning of February, as the buds are then far advanced.

Cordons.—These are suitable for training on walls, fences, or espaliers. The oblique cordon, trained at an angle of 45°, is the best for Apples and Pears, and for Plums to a less extent. They may be single double, or treble. The best form of pruning for this form is to shorten back all side-shoots to four or five leaves, from the end of July to the end of August, and further shorten them to two or three buds in winter. The leader should never be shortened till the limits of space are reached. By this method of oblique training a greater length of stem is obtained than by training the trees upright; the trees also fruit better, because growth is more restrained. As the trees grow older they may be lowered and still longer stems obtained. Apples may also be grown as horizontal cordons tied to wires, stretched between posts, and 12 ins. from the ground, alongside of garden paths. The cordons may be single and trained all in one direction, or of two branches, trained right and left. The pruning is the same as for oblique cordons.—J. F.

See also *FRUIT CULTURE, HARDY: GENERAL CONSIDERATIONS.*

PRUNING OF BUSHES.—See *PRUNING FRUIT TREES.*

PRUNING ROSES AND SHRUBS.

Roses are pruned, first to encourage stronger growth in the case of weak growers, and to weaken it in the case of strong growers; secondly, in order that the flowers may be larger and of better quality; thirdly, to admit light and air to strengthen and ripen the wood; fourthly, to make the foliage healthy and vigorous; and fifthly, to keep the plants within due bounds. Speaking in a general way, in the case of bush roses, the weakest-growing Hybrid Perpetuals and Hybrid Teas are pruned hardest, in order to make them produce stronger shoots during the following summer, and the strongest growers must have the best shoots cut in such a way that the next growths will be weaker. If strong growers were pruned hard they would grow stronger during the coming summer and flower badly or not at all. Those of intermediate vigour must be pruned in a medium way, cutting away neither too much nor too little, but just an amount calculated to give the requisite strength in the new growths. Bearing these things in mind the pruner must learn to use his own discretion to secure the best results. The instructions here given are to enable the beginner to prune Roses to get plenty of flowers for cutting and for garden decoration. To get fine blooms for exhibition, the pruning must in all cases be harder or more severe.

In pruning a bush rose the operator should begin by cutting out dead wood and snags, as well as all the weaker shoots that tend to crowd the centre. The remainder will be strong shoots from the base or near it, and laterals from older wood. Shoots from the base are mostly the strongest, and give rise to the best blooms. A simple way of dealing with these is to cut back 4–6 ft. shoots to 2–3 ft., or peg them down; shoots 2½–3 ft. in length to 12–18 ins.; shoots 1½ ft. in length to 8 ins., or 12 ins. if strong; and all weaker ones to 4 ins. or 6 ins. The laterals should always be pruned hard, say 2–4 ins., unless very strong. Another simple rule is to cut away one-third the length of the tallest growers; one-half the medium growers; and two-thirds of the weak growers. Examples of those that require only one-third of their length cut away are *Caroline Testout, Florence Pemberton, George Dickson, Gustav Grunerwald, La France, La Tosca, Louise C. Breslau, Rayon d'Or*, and *Ulrich Brunner.* A few bloom best when cut down to three or four eyes, such as *Coronation, Lady Faire, Lady Hillingdon, Liberty, Mrs J. Laing, Mrs R. G. Sharman-Crawford, Mrs W. J. Grant, Prince Camille de Rohan, Richmond*, and *Victor Hugo.* Roses that do best pegged down are *Frau K. Druschki, Gruss an Teplitz, Hugh Dickson, J. B. Clark, Juliet, Madame Isaac Pereire*, and *Madame Jules Gravereaux.*

Climbing Teas and Noisettes, and Climbing Hybrid Perpetuals should be allowed to grow much as they like, merely cutting out stems that are more than two years old when too crowded for the situation. Laterals may be thinned and the strongest ones shortened to prevent overcrowding.

Climbing Polyanthas may have the old and weak shoots cut away in August or September, as soon as they have done flowering, to let the strong young wood ripen. Examples are *American Pillar*, *Crimson Rambler*, *Electra*, *Goldfinch*, *Tausendschon*, *Trier*, and *Veilchenblau*.

Wichuraiana Roses, such as *Dorothy Perkins*, *Elisa Robichon*, *Excelsa*, *Hiawatha*, *Lady Gay*, *Leontine Gervais*, and *White Dorothy*, may be pruned much the same as Climbing Polyanthas, and at the same time, but in neither case need the stems that have flowered be cut away if wanted to cover a trellis, etc. Many shoots of the Wichuraiana Roses produce strong laterals without flowers, that will bloom the following year. It will be noted that all Climbing Roses bloom on short shoots from the wood of the previous year, so that strong young shoots should never be cut away.

China Roses require very little pruning. Long, straggling shoots may be shortened; then cut back the old flower stems to a good bud, and thin out the centre if crowded.

Japanese Roses (*Rosa rugosa*) and their hybrids flower on short shoots from the long stems of the previous year; hence these long stems should only be tipped or slightly shortened. Old stems may be cut out when crowded.

WHEN TO PRUNE.—Hybrid Perpetuals and Hybrid Teas should be pruned about the middle of March, in the south of England; during the third week in the Midlands; and during the fourth week in the far north. Tea Roses should be pruned about the end of March in the south; at the beginning of April in the Midlands, and about the second week of April farther to the north.

Shrubs.—Pruning in this case is only necessary to keep the bushes in shape, to reduce them to reasonable or moderate height, to prevent overcrowding of the branches, and to prevent one bush from growing into another and spoiling it. In carrying out the operation, in the case of flowering bushes, regard must be had to the time of flowering. Those that set their flower buds in the previous autumn, and bloom in spring or early summer, must be pruned immediately after flowering. The Forsythias, Flowering Currants (*Ribes*), *Prunus triloba*, *Spiraea arguta*, *S. Thunbergi*, *S. prunifolia*, and *S. canescens* may be pruned in April, earlier or later when flowering is finished. Shorten back the flowering shoots and trim the bushes into shape. Lilacs should have all suckers removed with the spade in winter, and be well cut back in June, if too tall, the weak shoots being cut out, if crowded. Guelder Roses and Snowball Trees (*Viburnum Opulus*), Mock Oranges (*Philadelphus*), Deutzias, and Weigelas should have their flowering shoots cut back after they have finished flowering, or be well cut back, if too tall, leaving the lower or short stems unpruned. Ornamental Cherries, Flowering Crabs, and Almonds should be pruned as little as possible, but if too tall or wide, trim them back after flowering. Cut the flowering shoots of *Hydrangea hortensis* well back after they fade, but leave the flowerless ones untouched.

Shrubs that flower on the young wood made during the current summer, may be cut back any time from November to the beginning of March. These include *Ceanothus azureus*, *C. Gloire de Versailles*, *C. Marie Simon*, etc.; also *Spiraea japonica*, *S. Anthony Waterer*, *S. salicifolia*, *S. ariaefolia*, and others of that class; also *Buddleia variabilis*, Colutea, *Hydrangea paniculata*, Honeysuckles, *Jasminum officinale*, etc.

Evergreen shrubs, such as *Berberis Darwinii*, *B. stenophylla*, *Buddleia globosa*, Choisya, Rhododendrons, etc., may have straggling shoots shortened, but all the rest left untouched.

In the case of wall climbers nail up all strong shoots necessary to cover the wall, and then shorten back side shoots to 2–3 ins. Chimonanthus, *Jasminum nudiflorum*, etc., should not be pruned till they have done flowering, then do it immediately.

Tools to Use.—All shrubs and trees with broad evergreen leaves, whether grown as bushes or for hedges, should be trimmed with a knife or sécateurs (not the garden shears), to avoid disfiguring the leaves. Laurels, Hollies, and Aucubas are examples of this class.

J. F.

PRUNING SHRUBS.—See *Pruning Roses and Shrubs.*

PRUNUS.—For the best species see *Trees.*

PRUSSIC ACID.—A popular name of Hydrocyanic Acid, which see in *Acids: Their Uses in Horticulture.*

PSAMMA.—Now included in the genus *Ammophila.*

PSEPHELLUS.—Now included in the genus *Centaurea.*

PSEUDATHYRIUM.—Now included in the genus Polypodium, for which see *Ferns and Fern Gardening.*

PSEUDO-EPIPHYTES.—See *Orchids: Potting and Watering of.*

PSEUDOLARIX.—For the best species see *Trees.*

PSEUDOTSUGA.—For the best species see *Trees.*

PSILA.—See Carrot Fly in *Insect Pests.*

PSYLLA.—See Apple Sucker in *Insect Pests.*

PTARMICA.—Now included in the genus *Achillea.*

PTERIDELLA.—Now included in the genus Pellæa, for which see *Ferns and Fern Gardening.*

PTERIS.—For the best species and varieties see *Ferns and Fern Gardening.*

PTEROCARYA.—For the best species see *Trees.*

PTEROCEPHALUS.—Now included in the genus Scabiosa. See *Scabious.*

PTEROLOBIUM.—Now included in the genus *Thlaspi.*

PTILOTRICHUM.—Now included in the genus *Alyssum.*

PTYCHOTIS.—Now included in the genus *Carum.*

PULEGIUM.—Now included in the genus *Mentha.*

PULICARIA (Nat. Ord. Compositæ).—Two species of this genus, *P. dysenterica* (Syn. *Inula dysenterica*) and *P. vulgaris* (Syn. *Inula Pulicaria*), known respectively as Flea-bane and Lesser Flea-bane, are sometimes grown, or offered for culture, in herbaceous borders. They are yellow-flowered plants blooming from June to August, and averaging 1–2 ft. in height. They cannot be said to be subjects of much value, though of very easy culture. Care should be taken not to confuse this genus with the more valuable *Erigerons* and *Inulas* (see separate articles), on account of the similarity of the English names.

See also under Erigeron in *Medicinal Herbs.*

PULMONARIA (Lungwort. Nat. Ord. Boraginaceæ).—Many of the species of this genus are now referred to the genus *Mertensia*, in the article on which we describe *Pulmonaria alpina* as *Mertensia alpina*;

P. maritima as *M. maritima*; *P. paniculata* as *M. paniculata*; *P. sibirica* as *M. sibirica*, and *P. virginica* as *M. pulmonarioides*. All the species are hardy herbaceous perennials useful for the front of mixed borders, shrub borders, and so on. They thrive well in ordinary light, rich soil in a sunny site, and are best propagated by division of the roots in March, when they may be most successfully planted, or by seeds sown at the usual time in the summer. We recommend the following, all of which are grown at Kew:—

Pulmonaria angustifolia. — This may be used, on account of its dwarfish habit, in the rock garden. It bears pretty violet flowers in April and May, on plants 9 ins. high. Its variety *azurea* bears delightful sky-blue flowers, and grows 12 ins. high.

P. arvernense.—This bears pretty purple-blue flowers from April to June, and grows 12 ins. high.

P. azurea.—This nursery sort is the variety *azurea* of *P. angustifolia* described above.

P. montana (Syn. *P. mollis*).—This bears attractive blue flowers from April to June, and grows 12 ins. high.

P. *officinalis* (COMMON LUNGWORT).—This may be considered the least attractive of all. It is found growing wild in many parts of England, and bears, as many readers will be aware, pink flowers in April and May, on plants 12 ins. high.

P. rubra.—This is a useful bright red sort blooming in May and June, and growing 12 ins. high.

P. saccharata.—This is a pretty pinkish species blooming in May and June, and growing 12 ins. high.

PUMPKIN (*Cucurbita maxima*).—See *CUCURBITA* and *PUMPKINS AND GOURDS.*

PUMPKINS AND GOURDS.

These may be grown and used in much the same way as *VEGETABLE MARROWS*, which see. Some sorts are attractive plants for growing up or alongside of fencing on allotments. For descriptions of the very numerous forms of edible Gourds and the several kinds of Pumpkins reference should be made to the catalogues of the bigger seed specialists. The best ornamental species are included in our article on *ORNAMENTAL GOURDS.*

PUNICA.—For the best species see *CLIMBING AND TRAILING PLANTS.*

PURGING FLAX.—See under FLAX in *MEDICINAL HERBS.*

PURITY TEST.—See *SEED TESTING.*

PURPLE-FLOWERING RASPBERRY (*Rubus odoratus*).—See *SHRUBS.*

PURPLE LABURNUM (*Laburnum Adami*).—See *TREES.*

PURPLE LOOSESTRIFE. — See *LYTHRUM.*

PURPLE OSIER (*Salix purpurea*).—See *TREES.*

PURPLE ROCK-CRESS.—See *AUBRIETIA* and *CRESS.*

PURPLE VETCH (*Vicia bithynica*).—See *VICIA.*

PURSLANE.—See *SALAD PLANTS.*

PURSLANE, ANNUAL (*Portulaca.* Nat. Ord. Portulaceæ). — The salading Purslane is described in our article on *SALAD PLANTS.* Some of the annual forms are, however, useful in the garden and require a sunny and rather dry position. In dull, wet seasons they are not a success. Seed should be sown in April, and the seedlings either thinned or transplanted to 6 ins. apart. The best species is:—

Portulaca grandiflora.—A purple and yellow June flowered annual, of which scarlet and white forms are also available. Height, 6 ins.

PYCNOPTERIS.—Now included in the genus NEPHRODIUM, for which see *FERNS AND FERN GARDENING.*

PYGMY CATCHFLY (*Silene Pumilio*).—See *SILENE: ROCK GARDEN SPECIES.*

PYRAMID FRUIT TREES.

To those about to plant Pyramid apples my advice is similar to that given by "Mr Punch" to those about to marry—"Don't."

This is not a revolutionary doctrine, and requires some explanation. In speaking of pyramids now is meant the true pyramid—a tree composed of one upright centre stem, the branches radiating outwards therefrom and one above the other.

If a symmetrical appearance only is aimed at, the pyramid is perhaps easier to keep neat, but if the best fruit in quantity be the main object, then the open, cup-shaped bush is infinitely preferable, and may also be an object of pleasing appearance.

There are two very serious and irremediable objections to the pyramid form for apples. First, one side is always in the shade; the branches on the sunny side necessarily shade those on the other. Secondly, sap naturally rises, and the branches at the top get a greater share than those below, the result being weakness and gradual suppression of the lower branches, unless great skill is exercised in maintaining the balance.

The true pyramidal form for pears and plums is not so objectionable as it is in the case of apples, since both these fruits mature fairly well in partial and intermittent shade; but apples require a maximum amount of sun to ripen and finish properly; also direct sunshine is necessary for the ripening of the wood and fruit-buds.

The open bush form is the better because every branch receives its full quota of sunshine, the rays reaching the branches on the north side between those on the south. It should be cup-shaped, the branches emanating from nearly one point in the stem about 1 ft. from the ground, and the stem should terminate at this height. A better simile is that of a very short-stemmed wine-glass. There is no fear then of one branch usurping all the share of the sap, as the sap flow is divided between eight or twelve main branches forming the sides of the glass.

Most gardeners know that sunshine is absolutely necessary to enable the leaves to perform their function of converting the crude sap into food for the tree, and, therefore, those leaves which get less than their share cannot nourish the fruit buds as they should. Fewer and weaker fruit buds mean fewer and weaker flowers and consequently less fruit; also apples grown in partial shade are never so well finished as are those grown in the full sun.

Granted, then, that the open bush form is the best, the method of pruning to form this shape is to cut down the one-year-old tree to about 1 ft. 6 ins. from the ground line. From this point will emanate two or three branches. These are cut back the next winter half-way, and then from this point two or three more grow. Select two in the best position for the formation of the side of the cup, and then there will be six main branches. Cut half the new wood away again the following winter; again select two branches, and the result is twelve main branches all forming the sides of the cup.

The amateur or private gardener usually buys a tree with the foundation already laid in the nursery, and the earlier operations have, in this case, been carried out.

As a rule twelve branches are sufficient, and when these have attained a height of 8 ft., the tree may be said to be fully grown. During the earlier years all side shoots not required for extensions, should be cut back in late August or early September to about five or six leaves, in order to encourage the formation of fruit buds on the few inches of wood left, and eventually fruit spurs or collections of fruit buds. Once the tree has attained full size all side shoots may be cut back in late summer, leaving the extensions or leading shoots at the tops of the branches till winter, when they also should be removed. In after years the fruit spurs may be thinned to contain not more than two fruit buds next the main branch. Amateurs may recognise fruit buds by their larger size and, in the case of apples, generally downy scales, wood buds being very small in comparison.

The same method of pruning is adopted in the case of the pyramid, except that the centre stem is carried up straight, the young wood being cut back half-way in winter, to provide the branches which grow from the three or four wood buds immediately below the pruning point.

Similar procedure obtains in the case of bush and pyramid pears and plums, but side shoots of plum trees must not be so closely pruned at any time, since the bulk of the fruit is produced on young, weak twigs of the previous year's growth. The method of formation is the same in every case.

Sweet Cherries are managed on similar lines, but all pruning should be done in September before the leaves fall.

Cherries are impatient of the knife, and if pruned in winter signify their dislike by "gumming" and becoming unhealthy. When pruned in late summer the leaves can take up more of the sap, bleeding is avoided, and the leaves being still active, the cut is healed quicker and better than is the case in winter. The Morello Cherry is quite unlike the above in its habits; it fruits almost entirely on young wood made the previous summer. Therefore a large proportion of moderately strong side shoots must be left in to carry next year's crop, only cutting back in September some strong young shoots to keep up a succession of young growth, and removing as many as possible of those shoots that have just borne the crop.

There is no doubt whatever that the open bush is the finest form of all for *general* use. If grafted upon dwarfing stocks (as most apples and all pears should be), some fruit may be expected under ordinarily favourable conditions from a three-year-old tree, the yield gradually increasing as the tree grows older and more fruit spurs are produced.

The same principles governing other forms apply in the case of bushes and pyramids in the matters of planting, staking, spraying, and manuring, except that phosphates and lime are more necessary than nitrogenous manures.

The best average distance apart at which to plant is 12 ft. Ten feet apart is adequate if the trees are kept closely pruned, are growing on light land, and are not of too spreading a variety; but it is far better to err on the side of greater space than to overcrowd. At these distances currants, gooseberries, raspberries, and strawberries may be grown between for the first ten years at least.

It is most important that the soil near bush fruit trees on dwarfing stocks be *not* dug deeply, as the fibrous feeding roots lie mostly near the surface.

Bushes have the added advantage that the form is eminently suitable to *every* variety of apple, cherry, pear, and plum, with perhaps the reservation that the finest form of all for sweet cherries, and only sweet cherries, is the full orchard standard, which form is not, however, often suited to the needs of the average garden.—W. P. S.

For hints on PRUNING see *PRUNING FRUIT TREES.*

PYRENEAN DEAD NETTLE.—See *HORMINUM.*

PYRETHRUM (Nat. Ord. Compositæ). — The plants formerly known by this name are now botanically included with the *CHRYSANTHEMUMS*, to the separate articles on which reference should be made. The popular Pyrethrums of the garden are seedling varieties or hybrid forms of *Chrysanthemum coccineum* (Syns. *C. roseum* and *Pyrethrum roseum*). They are of great value in the garden, and are so well known that little description is necessary. The efforts of raisers have given us numerous very beautiful varieties, ranging in colour from pure white to purple, through various shades of blush, pink, rose, and crimson. They differ also in form, some having perfectly double flowers and others with guard florets like an Anemone. The single varieties are also highly decorative, and are much employed for table decoration. Most Pyrethrums flower in May and June, and are indispensable in the border at that season.

Culture. — No special soil is necessary for the successful culture of Pyrethrums, since they will grow well in any good, fertile soil, preferring one of a medium loamy nature, or even light loam, strong clay being the worst soil of all for them. The situation should be sunny, and the ground should be deeply dug and well manured first of all. Opinions differ as to the best time for planting. If purchased in pots this may be done at any time. Spring is a good time for plants not in pots, but the writer prefers to divide and plant immediately after the flowering, giving the plants a good soaking of water to settle them in the soil. Slugs are partial to Pyrethrums, especially when newly planted, hence the frequent losses when autumn or early spring planting is adopted. In many gardens it is necessary to stake the plants so as to keep the stems erect and the blooms flat. This should be done as neatly as possible. If the early crop of flowers is cut as they become past their best a few others will usually be produced in autumn. For this last purpose it is advisable to grow a number of plants in the reserve garden.

Propagating Pyrethrums.—Wonderfully good results may be obtained by sowing seeds, and, if a good strain is purchased, a fair proportion of double-flowered varieties will be obtained. Named varieties can only be propagated by division, which should be done as soon as the first flowering is over, and not in April, as is so often recommended, unless very late flowers are desired. The stools should be carefully cut with a sharp knife so as to allow of at least one crown to each plant. When the weather is dry at planting time it is a good plan to dip the fibrous roots in a puddle of soil and water. The plants should be made very firm in the ground. Seeds may be sown in the same way as those of any other hardy perennial and the seedlings treated in a similar manner to those plants.

What to Grow.—The number of varieties is immense, and most nurserymen have a good selection, frequently under other names, but representing a variety not distinct from that grown under another name by another dealer. Purchasers are advised to see the plants in bloom if possible, but the following selection contains none but distinct and first-class varieties in their respective colours :—

SELECTION OF VARIETIES.

DOUBLE.—*Alfred Kelway*, crimson ; *Aphrodite*, white ; *Beauty of Laeken*, crimson, anemone flowered ; *Capt. Nares*, crimson ; *Celia*, pink, golden centre ; *Cleopatra*, yellow and white ; *J. N. Twerdy*, crimson, tipped with gold ; *La Vestale*, blush ; *Melton*, crimson - scarlet ; *Othello*, peach-blossom ; *Pericles*, yellow and fawn ; *Queen Mary*, pink ; *Sir James Miller*, crimson ; and *White Aster*, white.

SINGLE.—*Agnes Mary Kelway*, pink ; *Dagon*, rose ; *Dorothy Kelway*, cherry-red ; *Duchess of Brabant*, pink ; *James Kelway*, scarlet ; *John Malcolm*, pink ; *Mrs Bateman Brown*, crimson ; *Mrs William Kelway*, pink ; *Peter Barr*, crimson ; *Pink Pearl*, pink ; *Princess Marie*, white ; and *Purity*, white, tinted blush.—S. A.

For half-hardy sorts see *ANNUALS, HALF-HARDY : LIST OF.*

PYRETHRUM POWDER AND SPRAY. See *INSECT PESTS : GENERAL METHODS OF DESTRUCTION.*

PYRIDINE AND SOAP.—See *INSECT PESTS : GENERAL METHODS OF DESTRUCTION.*

PYROLA (WINTER GREEN. Nat. Ord. Ericaceæ).—This is not a very important genus, but it contains some pretty dwarf-growing hardy herbaceous perennial plants useful for edging, for rock borders, and in the rock garden. They are of very easy culture so long as a lightly shady site and plenty of peat are provided. The best modes of propagating them are by sowing seeds in the summer in the usual way and by division of the roots in March, which is also the best planting period. Care must be taken not to confuse this genus with the medicinal plant known also as Winter Green, namely, *Gaultheria procumbens*. (See article on *MEDICINAL HERBS*.)

As regards species to grow, *Pyrola chlorantha* (Syn. *P. asarifolia*), *P. elliptica*, *P. minor*, and *P. secunda* are all good. These bear yellowish, white, red, and white flowers respectively in June, and average 3–6 ins. high. *P. rotundifolia* and its variety *asarifolia*, both known as the CANKER LETTUCE, are found wild, and are of small garden value.

PYRUS.—For the best species see *TREES.*

Q

QUAKING GRASS.—Two kinds of this are useful, the GIANT, and the LITTLE. See under BRIZA in *ORNAMENTAL GRASSES*, and see also *BRIZA*.

QUAMASH.—See *CAMASSIA*.

QUAMOCLIT.—Now included in the genus *IPOMOEA*.

QUASSIA.

This is such a useful material for the gardener that it must be given a short article to itself. It is the standard remedy for Aphis and other leaf-sucking insects, but it is not effective against such leaf-biting creatures as caterpillars.

Quassia chips may be purchased from any good nurseryman or horticultural sundriesman. They are obtained from a tree botanically known as *Picraena excelsa*, and the extract of this wood is an exceedingly bitter substance. Mr. H. H. Cousins, in his little book *The Chemistry of the Garden*, tells us that a ton of Quassia chips contains only 10 oz. of this active principle; but so intense is its flavour that this small amount is capable of embittering most strongly over 24,000 gals. of water.

The preparation of Quassia Wash is a long and tiresome business. At least two days must be taken for this work, and gardeners who have not got the patience or the time to spend on boiling up the liquid are recommended to use proprietary washes instead, so long as they choose those which have been proved to be reliable. Quassia Wash is, very briefly, made as follows:—

Take 1 lb. of Quassia chips and put them into a basin. Cover them with cold water, and allow them to soak for at least twelve hours, giving them a thorough stirring occasionally, say every four hours. Dilute to 1 gal. with water and pour the whole into a saucepan. Put the saucepan on the fire, and simmer the liquid for at least ten hours. One authority recommends the material to be simmered for forty-eight hours on end. Another writer recommends twenty-four hours, in order that the bitter extract may be dissolved from the wood, but the minimum should be ten hours, and if a longer period of boiling is possible do not hesitate to give it. Allow the liquid to cool somewhat, and pour through a fine strainer to remove every trace of woody matter, or the syringe will be quickly blocked up. When the material is thoroughly strained, take another vessel and beat up 10 oz. of the purest Soft Soap that you can get with a little hot water. Mix the soap well with the Quassia extract, stirring meanwhile, and when it has all been added, agitate the liquid thoroughly with an egg whisk, or even by pumping the syringe in it, to be certain that the soap is thoroughly intermingled with the Quassia.

This is what some gardeners call Stock Solution, and it will keep for a short time if it is put into tightly corked bottles, though it is unwise to keep it for any lengthy period. For use, take about one part of Stock Solution and nine of cold water, or if there is much spraying to be done, add 9 gals. of water to the 1 gal. of Stock Solution and thoroughly stir.

This mixture must be used cold or it may burn the foliage. As with other spraying solutions, it is well not to apply it when the sun is shining very brightly, or burning is almost certain to take place. The liquid must be applied with considerable force through an ordinary garden syringe, the nozzle being directed upwards to wash the creatures completely off. The under sides of the leaves must be treated as well as the upper portion, since Black Aphis and Potato Aphis appear to be fonder of the under sides than any other part.

Some gardeners believe that Soft Soap has an insecticidal value of its own, and that the addition of Quassia is unnecessary to remove Aphis or other leaf-sucking insects. This is quite a mistake. The function of the Soft Soap is to make the Quassia stick on, and it has no insecticidal value whatever. Various other materials such as Nicotine can be added to the Quassia solution in special cases, but if Quassia is thoroughly made as directed it should be quite effective for destroying the Aphis.—E. T. E.

QUASSIA AND SOAP.—See *INSECT PESTS: GENERAL METHODS OF DESTRUCTION.*

QUEBEC OAK (*Quercus alba*).—See *TREES.*

QUEEN ANNE'S DOUBLE JONQUIL (*Narcissus odorus minor plenus*).—See *NARCISSUS SPECIES.*

QUEEN OF FLOWERS.—A name applied to Roses. See *ROSES FOR ALL PURPOSES.*

QUEEN STOCKS.—See *STOCKS.*

QUELTIA.—Now included in the genus *NARCISSUS.*

QUERCUS.—For the best species see *TREES.*

QUETSCHE (*Prunus communis pruneauliana*).—See *TREES.*

QUICK-ACTING FERTILISERS.—See *FERTILISERS: QUICK-ACTING.*

QUICK-SETTING MORTAR. — See *MORTAR.*

QUICKLIME.—See *LIME.*

QUICKSILVER.—See *MERCURY COMPOUNDS.*

QUINCE.—The genus CYDONIA and *C. vulgaris.* See *QUINCES* and *SHRUBS.*

QUINCES.

If the garden has a pond, Quinces will flourish on the banks, where the roots can enter the water. The blossoms are very elegant; the fruits should always be left on the tree into November to perfect growth. They are then useful for jelly or marmalade as well as for flavouring apple tarts. The Pear-shaped is the most generally useful; but the Portugal is larger and less astringent. It helps fertility if the boughs and spray branches are thinned occasionally. The trees succeed in any damp soil, and require no care beyond that usually given to hardy fruit. In a warm season, Quinces may ripen before November. They are fit to gather when deep yellow.

G. B.

QUINCUNX PLANTING.

This is a style of planting in which each plant or tree is opposite a space between two plants or trees in the rows immediately above and below it. The diagram below explains this mode of planting.

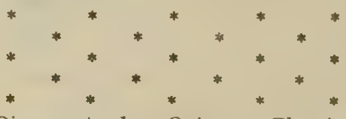


Diagram to show Quincunx Planting.

Trees planted as above may or may not be equal distances apart each way, according to arrangement.

QUINOA.

The leaves of this are used, like those of many other crops, instead of Spinach in districts where the latter will not grow. Quinoa may be cultivated in the same manner as *ORACHE, or MOUNTAIN SPINACH,* which see.

RABBIT BERRY.—The genus Shepherdia. See *Shrubs*.

RADISH (*Raphanus caudatus* and *R. sativus*. Nat. Ord. Cruciferæ).—The quality of these popular roots depends very much on the growth of the plant. If the growth is slow then the roots will be hot, tough, and uneatable; it is the quickly-grown radishes which are so much enjoyed.

Culture.—For very early supplies, sow seed on a mild hotbed in January. Sowings may be made in a warm border out of doors about the middle of February, other sowings being made every fortnight until August; but owing to the abundance of salads from July onwards, it is the earlier roots that are most highly valued.

Whether radishes be sown in frames or outside, a rich bed should always be provided; the surface soil should be free from stones, and broken down very finely before sowing the seeds. Sow very thinly.

From April until August seed should be set in cool, damp situations, or where water can easily be given during dry weather. Cover the seed very lightly, protecting from birds, which in some districts play havoc with the early batches.

Plants growing in frames must not be coddled, though none but tepid water should be used in watering. After thinning out, give a little air on all favourable occasions.

The earliest outdoor sowings should have the protection of a few bushy sticks, or a light covering of hay or straw placed over them; this covering must not be so dense as to keep light and air from reaching the plants. Fish netting is very useful for covering beds, as this allows the addition of fuller light, protection being given should the weather turn unexpectedly cold after germination. Commence to use the roots as soon as these attain the size of a hazel nut, always pulling from that part of the bed which is most crowded.

Varieties:—*For Summer Use*.—French Breakfast, Icicle, Long Scarlet, Long White, Turnip Radish, and Wood's Frame.

For Winter Use.—Sow in August any of the following:—Black Spanish Long, Black Spanish Round, and China Rose Winter.—F. R. C.

RADISH FLY.—See *Insect Pests*.

RAGGED ROBIN (*Lychnis Flos-cuculi*).—See *Lychnis*.

RAISED BEDS.

We wonder why these are so common in all gardens which have been made a few years. We can never see anything beautiful about beds raised or mounded up 12–18 ins. or more above the lawn level, and such beds are extremely difficult to dig, plant, or keep gay.

The idea that bedding plants look best when planted on raised mounds is a fallacy. We do not object to beds being raised a few inches; this is at times necessary to show off plants when only one species is used. If the "rising mound" effect is wanted, it can be obtained by other means than by piling on soil; taller varieties of the same genus can, for instance, be planted, or again plants of another, though similar, genus could be set.

Let us hope that high raised beds will die out, for they mean terrible waste of time and labour. Modern gardeners can do better than put their energies into raised beds; they can spend their time evolving colour schemes, the charm of which is unrivalled.

In gardens where there are many raised beds, it would be a step in the right direction to remove the mound of soil, and deepen the soil below. A bit of extra soil is always useful to gardeners, especially when it is rich soil produced by frequent manuring, as is the case when bedding plants are grown. Then the raised effect can be obtained by planting the dwarfer subjects round the margin with taller specimens in the centre. Good, tall plants are *Antirrhinum majus*, *Lobelia cardinalis*, *Schizanthus Wisetonensis*, *Zinnia Tall Double*, etc.—E.

RAKES.—See *GARDEN TOOLS.*

RAMBLER ROSES. — See *ROSE CLASSES.*

RAMONDIA (ROSETTE MULLEIN. Nat. Ord. Gesneraceæ). — This genus consists of two species which require a shady situation, and succeed best when planted in rocky crevices or joints of stone walls. Both are propagated by means of offsets, or by seeds sown in gentle heat in spring.

Ramondia pyrenaica.—This bears rosettes of green wrinkled leaves, lying flat against the wall. Flowers violet-purple, with orange centres. Site, shade. Soil moist, gritty peat and loam. Flowering Period, May to August. Height, 2 ins.

R. serbica.—The rosettes of smaller leaves of this sort are covered with soft brown hair. Flowers pale blue or mauve. Site, shade. Soil gritty peat. Flowering Period, May to July. Height, 3 ins.

R. serbica Nathaliae. — A form from the Carpathians, with more deeply coloured flowers and bright-coloured anthers.

NEW VARIETIES.

Ramondia pyrenaica pallida. — This bears soft mauve flowers, three to four on a stem.

R. serbica Nathaliae alba.—This has pure white flowers, with an orange ring at their base.

RAMPANT GROWING ROCK PLANTS. See ROCK PLANTS OF RAMPANT GROWTH in *ROCK PLANTS FOR ALL PURPOSES.*

RAMPION (*Campanula Rapunculus.* Nat. Ord. Campanulaceæ).—This plant deserves wider cultivation than it at present receives from all classes of gardeners; the white, fleshy tap-roots being either eaten in a raw state or boiled and eaten as asparagus, while the leaves are highly appreciated in some quarters as a salad.

Culture.—The first sowing to supply roots from August onwards should be made in the open ground early in March. Other sowings may be made at intervals until the end of May to maintain a supply throughout the winter. Wherever possible a semi-shaded position should be selected for the bed, and the land enriched with plenty of well-decayed manure or leaf-soil.

Allow nothing less than a foot between the rows, and early in growth reduce the seedlings to about 6–8 ins. apart. When the plants are well through the soil, give the bed a good hoeing, after which but little trouble need be bestowed upon it.

Some time during the month of November, take up all roots intended for winter use and store between layers of dry sand or earth in a dry shed or outhouse where frost is not likely to reach them. Treated thus, the roots will retain their plump character all the winter.

F. R. C.

RANUNCULUS (*R. asiaticus.* Nat. Ord. Ranunculaceæ).—The Ranunculus family includes the common Buttercup and the King Cup of our meadows; the beautiful double white Fair Maids of France of our mixed herbaceous borders; and the Ranunculus, the once dearly loved and widely cultivated flower of the florists. For some reason this last species has appropriated to itself the name of the whole genus, and it is now invariably the plant that is meant when in garden language a Ranunculus is mentioned.

One hundred and forty years ago the Ranunculus was widely cultivated, and took rank with the Tulip as a florists' flower. Beds of Ranunculuses are, however, seldom seen now, and it is a mystery to the writer to know what becomes of all those that are annually advertised in trade catalogues.

Types of Ranunculus. — There are now three special types on the market, namely, the *French*, the *Persian*, and the *Turban.* They vary in the size of bloom and height of plant. The first of these is the largest flowered and the tallest in stature. The second is the most refined and the shortest in growth, and the earliest to flower. The third is intermediate between the two. The Dutch and the Scotch, which are frequently referred to in lists, usually indicate a special strain of the Persian. The French Ranunculuses are probably hybrids between special strains of the Persian and the Turban or Turkish varieties. They (the French) grow to a height of about 12–18 ins., with good cultivation, and are very effective in a mass.

Culture.—All the types like a good rich soil, but it must not be "rank." They like moisture, but the bed must be well drained, for if there is any stagnant water about the roots, the foliage soon turns yellow. They like shade from the hot afternoon sun, but not shade from overhanging boughs. Those who wish to grow them to perfection should make specially prepared beds. The old soil should be removed to a depth of 20–24 ins. Then some broken bricks or stones put at the bottom and covered with a layer of moss; then the hole should be filled up with the prepared compost, which should be made up of rich mellow loam, old decomposed cow manure, crumbly leaf-mould and sharp sand in about equal proportions. The tubers should be set (claws downwards), with 2 ins. of soil over them. Weak stimulants and regular watering are necessary during the spring when they are making growth, for they must never become dry. Watering must be gradually withheld after the flowers are over, and when the foliage has died down, the tubers may be lifted, dried, and sorted, so that they can be put away until planting time comes round again. In very warm, favoured places Ranunculuses may be planted in the autumn, but for most gardens in the British Isles February or very early March is quite soon enough; even then the young growth must be covered to protect it from severe frosts. It is advisable to cover or surround the claws with sand when planting.

Varieties (FRENCH and PERSIAN).—The names of these vary so much according to the fancy of the seller that no good purpose would be served by giving selections here. Various shades of rose, red, orange, yellow, and pure white are to be found among them. The height averages 12–15 ins.

TURBAN.—The names of these are more fixed than those of the other two sections, and some of the best named varieties are: *Grootvorst* (crimson); *Hercules* (white); *Merveilleuse* (Nankeen yellow); *Romano* (scarlet); *Seraphique* (citron-yellow); and *Viridiflora* (green with scarlet edge). The height averages about 12 ins.—J. J. & E. T. E.

RANUNCULUS: Perennial Border Species.—Any good garden soil suits these, and they require none but ordinary perennial border culture, being propagated by division of the roots at the usual time, and best planted in February. We recommend the following:—

Ranunculus aconitifolius flore pleno (FAIR MAIDS OF FRANCE).—This is an old favourite, and bears white flowers in May and June, on plants 2 ft. high.

R. acris flore pleno (BACHELOR'S BUTTONS).—This is a double form of the COMMON BUTTERCUP or UPRIGHT CROWFOOT, bearing bright yellow flowers in May, and growing about 2 ft. high.

Rock Garden Species.—Many of the alpine species of this genus are difficult to grow, and consequently no good purpose would be served by describing many here. The following, however, are the easiest to manage, and may be propagated by root division in the autumn or the spring:—

Ranunculus alpestris.—This bears three-lobed leaves in tufts. Flowers pure white. Site, half-shade. Soil very gritty. Flowering Period, June to August. Height, 3 ins.

R. amplexicaulis.—This has tufts of stems and greyish leaves. Flowers white, with golden centre. Site, half-shade. Soil heavy loam, though gritty. Flowering Period, April to June. Height, 12 ins.

R. montanus.—This is another dwarf species. Flowers yellow, and large. Site sunny. Soil moist loam. Flowering Period, May to July. Height, 3 ins.

R. nyssanus.—This has greyish, divided leaves. Flowers citron yellow. Site, half-shade. Soil moist, gritty loam. Flowering Period, May to July. Height, 12 ins.

Water Garden Species.—The best of these are briefly described under CROWFOOT in our article on *WATER GARDEN: PLANTS FOR THE.*

W. I. & E. T. E.

[Species of little garden value or importance are very numerous. The following, though sometimes highly recommended, need not be troubled with except in wild or water gardens: *Ranunculus arvensis*, the DEVIL'S CLAWS; *R. auricomus*, known as GOLDILOCKS; *R. bulbosus*, ST. ANTHONY'S TURNIP; *R. Ficaria*, the PILEWORT; *R. Flammula*, the LESSER SPEARWORT; *R. Lingua*, the SPEARWORT; *R. Lyallii*, the ROCKWOOD LILY; *R. repens*, the CREEPING CROWFOOT; and *R. Thora*, the MOUNTAIN WOLFSBANE.—EDITOR.]

RANUNCULUS: Historical Notes.

This is an old-time florists' flower which has long passed the hey-day of its popularity. Like most of them it was introduced many years ago. It came from the Levant, and the species usually called *Ranunculus asiaticus* is the one from which the florists' varieties were considered to have been the issue. Although the name Ranunculus is derived from the Latin *rana*, a frog, its common early English name was Crowfoot, and the seeker after knowledge concerning its earliest history will do well to remember that name. In old French garden literature a similar fact must be borne in mind—the equivalent name being Grenoillette, Renoncule being the modern one.

In the *Names of Herbes*, by William Turner (1548), he says: "Ranunculus is called in greeke Batrachion, in englishe Crowfote or a Gallande."

The references are so numerous that we can only skim the surface of them, or, properly speaking, only the surface of a few of them. Every botanical and horticultural writer has more or less had something to say about the flower.

Matthiolus in his Commentaries on the Six Books of Dioscorides includes no fewer than six woodcuts of Ranunculuses, with descriptive text, under the chapter headed "*De la Grenoillette*." This was in the French edition published in Lyons in 1579, and twenty-two years later Clusius, in his *Rariorum Plantarum Historia*, devotes about a dozen pages of text and gives twenty-one figures of various kinds of the flower, inclusive of *R. asiaticus*. Of course our own John Gerarde, in his famous *Herbal*, has something to say about the flower. Chapter 351 treats "Of Crowfootes," and twenty-two rough woodcut illustrations of the period enable the reader to follow his descriptions.

Yet another English old-time author, John Parkinson, in the *Paradisus Terrestris*, discourses upon the "Ranunculus. The Crowfoote." Twenty descriptions and some figures are recorded, the last five being varieties of *R. asiaticus*.

Abroad Ferrari, in 1633, in *De Florum Cultura*; Clarici, in his *Istorica*, 1726; Arena, in *Della Natura, e Coltura de' Fiori* in 1768—all Italian writers,—discourse upon the flower. Passing from its single to the double form, it became more and more appreciated. It found its way into the collections of all the famous florists at home and abroad. The Dutch improved it, as they did the Tulip and the Hyacinth, and traded in it most successfully; but the time was fast approaching when the English florist, by aiming at a standard of perfection of his own raising, was to step into the field and, as in the case of some of the other famous florists' flowers, create a far higher and more perfect type, judged by his standard, than had ever been produced by the continentals.

This flower, sometimes called the Turkey, Persian, or Tripoli Ranunculus, was so popular that independent treatises solely devoted to its culture were published quite early in its career, while in most of the old French and other continental florists' books, special cultural treatises on its management were inserted. Pierre Morin, a famous Paris florist of the seventeenth century, gives a descriptive catalogue of both single and double varieties in his garden. The Père d'Ardène published a little volume on its history and culture, which ran into three or four editions—a most interesting, scholarly, and practical little work. Another pioneer eminent in its culture was M. Valnay, who grew a fine collection in the Faubourg St. Germain in Paris in the beginning of the eighteenth century.

We have no Catalogues of the Dutch growers in those days to consult first hand, but Justice, in the *Scots Gardeners' Director*, tells us the Turkey and Persian Ranunculus were then being improved every year by seeding.

Voorhelm and Van Zompel were specifically named as successful raisers, and lists of their gains were given arranged according to colour. These divisions were headed (1) Purple and rose coloured; (2) Orange; (3) White mixed with red; (4) Yellow and red; and (5) Feuillemort colours. The prices are given at forty guilders per hundred named, but the raisers have some of surprising beauty at ten guilders per root.

Old English florists such as John Evelyn, John Rea, and his son-in-law Samuel Gilbert, help to bring us down to closer times. *The Compleat Florist*, 1740, gives two examples of Ranunculuses that are not quite double, and are wanting when judged by later standards, but the nearer we get to the beginning of the nineteenth century, we find gradual but certain improvement.

Maddock of Walworth, one of the old school of florists, gives an ideal figure of a fine double Ranunculus which accompanies the account of its culture in his *Florist's Directory* (1792). This was one of his specialities, and his collection of them was more numerous than his others, for he possessed over 800 sorts.

From this time onward, and well into the nineteenth century, the Ranunculus became quite a popular exhibition flower, and many are the names of eminent raisers, exhibitors, and growers. From being dependent on the Dutch for their novelties, the English began to raise their own seedlings. Thomas Hogg of Paddington, a writer on the subject, was one; Tyso of Wallingford was another; Dr. Horner, Geo. Lightbody, and others too numerous to be mentioned, followed on. Ranunculus Shows multiplied all over the country—they were mostly held in the village inns and hotels; and this part of the flower's progress can be easily followed up by reference to the periodical floricultural press, in which it was treated with considerable amplitude.

But, like other floral favourites, it had to sustain competition with rival claimants for popular esteem. Towards the middle half of the nineteenth century, interest in the Ranunculus as a show flower began to subside, and the records after the year 1850 show a marked decline in its cultivation and exhibition. Tulips, pinks, pansies, and carnations were given much more prominence; and in 1857, Shirley Hibberd expresses regret that the Ranunculus had then for some years been eclipsed by other floral favourites; that there were then but few professional growers, and that only two florists were then known who traded in the flower to any extent, viz., Mr. Carey Tyso and Mr. Lightbody.—C. H. P.

RAPHANISTRUM.—Now included in the genus *RAPHANUS*.

RAPHANUS (RADISH. Nat. Ord. Cruciferæ).—This is a genus of hardy annuals of no value from a floral point of view. The best known species is *R. sativus*, the COMMON RADISH. See article on *RADISH*, for culture.

RAPHIOLEPSIS.—For best species see *CLIMBING AND TRAILING PLANTS*.

RASPBERRIES.—See *BUSH FRUITS*.

RASPBERRY.—See *BUSH FRUITS* and *MEDICINAL HERBS*, also the genus RUBUS in *SHRUBS*.

RASPBERRY BEETLE.—See RASPBERRY MAGGOT OR BEETLE in *INSECT PESTS*.

RASPBERRY SHOOT BORER and RASPBERRY WEEVIL.—See *INSECT PESTS*.

RAT'S TAIL CACTUS (*Cereus flagelliformis*).—See *CACTI*.

RATS.—See *GARDEN ENEMIES*.

RAW PHOSPHATES.—See under PHOSPHATIC MANURES in *MANURES*.

RECTANGULAR BEDS: AREA OF.—See under AREAS OF BEDS AND BORDERS in *ARITHMETIC AND GARDENING*.

RED ASH (*Fraxinus pennsylvanica*). See *TREES*.

RED-BERRIED ELDER (*Sambucus racemosa*).—See *TREES*.

RED BIRCH (*Betula nigra*).—See *TREES*.

RED BUCKEYE (*Æsculus Pavia*).—See *TREES*.

RED CABBAGE, or Pickling Cabbage (*Brassica oleracea.* Nat. Ord. Cruciferæ).—Where preserves or pickles are in great demand, few more profitable crops than this could be mentioned, a single head of the larger growing varieties often weighing forty pounds or more being sufficient in itself to keep a large family well supplied with pickle for a whole year.

The usefulness of this crop is not confined to pickles, for in some households the smaller varieties are grown for use in exactly the same way as the green varieties, the taste being but little different. Generally speaking, however, the appearance of this in a cooked state is less appetising.

Culture.—Seed may be sown at two different periods of the year: in the spring, or in August and September. Where large size is the main consideration a sowing made during the month of August is recommended. Sow very thinly in an open bed containing plenty of well-decayed manure, leaf-soil or spent hops in order that the young plants may be well supplied with little fibrous roots, without which they rarely bear transplanting as well as most of their tribe. Being quite hardy, no covering is necessary, the plants remaining in the seed-bed until the following spring.

In selecting the summer quarters for these, preference should again be given to a good open site into which manure has been very freely dug and buried well beneath the surface. In planting, well bury the stem of the plant allowing at least 30 ins. between the rows, and the same distance between the plants. If less room is given, the plants, although making large outer leaves, fail to develop hearts of good size and firm texture.

Varieties.—Excellent sorts for garden cultivation are:—Niggerhead, and Ryder's Scarlet Gem.

F. R. C.

RED CEDAR (*Juniperus barbadensis, J. Scopulorum, J. virginiana,* and *Thuya plicata*).—See *TREES.*

RED CHAMOMILE (*Adonis autumnalis*).—See *ADONIS.*

RED CURRANT (*Ribes rubrum*).—See *BUSH FRUITS*, also under RIBES in *SHRUBS.*

RED CURRANT TOMATO (*Lycopersicum racemigerum*). — See *LYCOPERSICUM.*

RED DARNEL (*Lolium perenne*).—See *LOLIUM.*

RED DEADNETTLE, or RED DEAD NETTLE.—See *LAMIUM* and *WEEDS.*

RED FIR (*Abies amabilis*). — See *TREES.*

RED HORSE CHESTNUT (*Æsculus carnea*).—See *TREES.*

RED-HOT POKER. — The genus KNIPHOFIA and *K. aloides.* See *KNIPHOFIA.*

RED LARCH (*Larix pendula*).—See *TREES.*

RED LEAD.—See *LEAD COMPOUNDS.*

RED MAPLE (*Acer rubrum*).—See *TREES.*

RED-MILK FUNGUS.—See EDIBLE FUNGI in *FUNGI: EDIBLE AND HARMFUL.*

RED OAK (*Quercus rubra*). See *TREES.*

RED-OSIER DOGWOOD (*Cornus stolonifera*).—See *SHRUBS.*

RED PINE (*Pinus resinosa*) **and RED PLUM** (*Prunus nigra*).—See *TREES.*

RED SPIDERS.—See *INSECT PESTS.*

RED TURK'S CAP.—A decorative gourd. See *ORNAMENTAL GOURDS.*

REDBUD (*Cercis canadensis*) **and REDWOOD** (*Sequoia sempervirens*).—See *TREES.*

REED.—See *ARUNDO* and *PHRAGMITES.*

REED GRASS (*Spartina polystachya*). See *SPARTINA.*

REED MACE, or REEDMACE (*Typha*). See *TYPHA* and *WATER GARDEN & PLANTS FOR THE.*

REELS.—See Hose Reels in *Garden Appliances.*

REFUSE FROM CANNERIES.—See *Fish as Manure.*

REGAL PELARGONIUMS. — See *Pelargoniums.*

RELATIONS OF PLANT TO SOIL.—See *Plant Physiology.*

REMOTE BUCKLER FERN (*Nephrodium remotum*).—See *Ferns and Fern Gardening.*

RENANTHERA.—See *Orchids.*

RENOVATING OLD LAWNS.—See *Lawns and their Management.*

RESEDA (Nat. Ord. Resedaceæ). Quite a large number of species of this have been described, most of them of little value, which may be treated as half-hardy annuals, hardy annuals, or half-hardy perennials. Quite the most important species is *R. odorata* (see article on *Mignonette*). Other sorts include *R. lutea*, known as Base Rocket, and *R. Luteola*, the Dyer's-weed, which is sometimes foolishly confused with the Dyer's Woad (*Isatis tinctoria*), described in our article on *Isatis.*

RESERVE GARDEN.

Head gardeners of big places often put themselves in a difficult position through neglecting to have a Reserve Garden. They sow quantities of various seeds in their frames and find that they have nowhere to prick the seedlings off, or they find they have no reserve stock in case some of the border plants should fail.

We consider it is a very big mistake indeed not to have a Reserve Garden. Even in connection with quite the smaller gardens (so abundant nowadays), it will be found of immense value; and where complete colour schemes throughout the summer season are aimed at, the Reserve Garden will be found invaluable for keeping fresh stock to fill in gaps when the various plants in the herbaceous border become over.

Annual Plants.—The main stock of these will, of course, be sown in the visible or show borders of the garden, but it is distinctly advisable to sow a few seeds of those which will transplant readily in large circles in the Reserve Garden. They can then be carefully lifted and set in the show borders if need be, or they form a useful means of supplying cut bloom for the home without destroying the floral beauty of the borders. These annuals should be sown very thinly, and crowding must be absolutely avoided, since if it is not, they will not be worth moving.

Biennials.—These plants are dealt with more fully under their various names. They are sown out of doors in the summer, and the Reserve Garden is the right place to sow them in. They can then be pricked out and will be ready for transferring to the winter beds or the herbaceous border in October. It is well to say here that they must be sturdy plants before being put out in their final positions.

Perennial Plants.—When these are raised from seed as they should be by outdoor summer sowing, the Reserve Garden is much better than a frame. They also can be transplanted the same year they were sown, into the permanent positions, after being previously pricked out 6 ins. apart each way in the Reserve Garden.

Other Uses of Reserve Garden.—In part of the Reserve Garden the good soil should be dug out to the depth of 1 ft. and used for the garden. The hole produced should have 3 ins. of broken stone put in, and then be filled up with sifted coke-ashes. The bed resulting is highly useful for plunging plants in, and may be used for winter blooming indoor Chrysanthemums in the summer, and for rock plants in pots throughout the year.

Site for Reserve Garden.—The site should be in full sun, near to a water tap, well, pump, or other means of water supply, sheltered from North and East winds and dry in winter. The soil should be light; if it is heavy it should be lightened by adding plenty of sand or sharp road grit.

Some gardeners use the Reserve Garden as a place for storing composts, manure, etc. This is undesirable. It is better to have a Compost or Manure Yard for this purpose.—E.

RESIDUAL DEPOSITS.—See under SUPERFICIAL DEPOSITS in *GARDEN GEOLOGY*.

RESPIRATION.—See *PLANT PHYSIOLOGY*.

REST HARROW (*Ononis arvensis*).—See *ONONIS*. See also the genus ONONIS in *SHRUBS*.

RESTREPIA.—See *ORCHIDS*.

RESURRECTION PLANT (*Anastatica hierochuntica*, Syn. *A littoralis*. Nat. Ord. Cruciferæ).—This plant, also known as ROSE OF JERICHO, is more curious than beautiful. Its foliage is almost ferny, and is capable of being drawn into a ball, and expanding so that the plant is well over 1 ft. across, according to whether it is kept dry or moist. Full-grown plants keep indefinitely out of soil; we have one by us now which has been kept in a drawer for twenty years, but is expanding just as it used to do long ago. We have never seen the plant in flower ourselves, but others tell us that it bears white blooms in July and onwards, on plants 12 ins. high. It can be raised from seeds sown in gentle heat and pricked off in the usual way for planting out.

Curative Properties.—Many superstitious cures surround the name of the Resurrection Plant, but laying all these aside it does appear to have some curative properties. A mature plant put in a saucer of water and stood in the room day and night will emit a faint but pleasing odour, and this tends to drive off or lessen colds and other similar maladies. Very refreshing sleep is gained by some if a plant is put at the bedside before retiring.

RETARDING.

Gardeners will not find it possible to do this satisfactorily as special cooled chambers are required. Retarded bulbs, corms, or crowns are offered so cheaply, however, that it is certainly not worth while to attempt to carry out the work at home.

REUTERA.—Now included in the genus PIMPINELLA.

REVERSION IN BLACK CURRANT.—See *DISEASES OF PLANTS*.

RHAMNUS.—See under CASCARA SAGRADA in *MEDICINAL HERBS*.

RHAPIS.—For the best species see *PALMS*.

RHAPONTICUM.—Now included in the genus *CENTAUREA*.

RHEUM (RHUBARB. Nat. Ord. Polygonaceæ).—This is a genus of hardy herbaceous perennials, most of which are too coarse for use in the herbaceous or mixed borders, but which come in handy as giant subjects for the wild garden. *R. officinale* is the well-known MEDICINAL RHUBARB. It and *R. collinianum* are good subjects for water gardens (see article on *WATER GARDEN: PLANTS FOR THE*). *R. Rhaponticum* is the even better known GARDEN RHUBARB, famed as a subject for summer tarts (see article on *RHUBARB*). *R. acuminatum*, with its purple flowers in July, and *R. Emodi*, with its white June opening flowers, are useful for the wild garden, and the same remark applies to *R. macropterum*, *R. nobile*, *R. palmatum*, *R. Ribes*, and *R. rugosum*, which bear greenish-white flowers in the summer, though the variety *tanghuticum* of *R. palmatum* is an ornamental border species. All the above are grown more for their foliage than for their flowers, and range in height from 2 ft. to over 4 yds.

RHEXIA.—See *Deer Grass.*

RHINOPETATUM.—Now included in the genus Fritillaria. See *Fritillary.*

RHIPSALIS.—A genus of cactaceous plants. See *Cacti.*

RHIZOBOTRYA.—Now included in the genus Cochlearia.

RHIZOCTONIA SCAB.—See under Black Speck in *Potato Diseases.*

RHIZOGLYPHUS.—See Bulb Mite in *Insect Pests.*

RHIZOMATOUS IRISES.—See under Non-Bulbous or Rhizomatous Species in *Irises.*

RHIZOMATOUS PLANTS.—See *Kinds of Crops.*

RHIZOME.—An underground stem.

RHIZOTROGUS.—See under Chafers in *Insect Pests.*

RHODANTHE.—Now included in the genus Helipterum. See *Annuals, Half-Hardy: List of*, and *Everlasting Flowers.*

RHODIOLA.—A synonym for *Sedum*, which see.

RHODODENDRON (Nat. Ord. Ericaceæ).—The Rhododendron appears to have been first introduced about 1736. Between then and 1817, several species were introduced from the Caucasus, Gibraltar, the Himalayas, North America, and various parts of Asia, namely, *R. arboreum*, *R. catawbiense*, *R. caucasicum*, *R. maximum*, and *R. ponticum.* Mention must be made of the foregoing species, as it was from these that the first hybrids were raised, and it is noteworthy that some of the earliest raised hybrids still hold their position amongst the best of varieties in cultivation at the present time, notably *R. altaclerense*, *R. russellianum*, *R. South Stoneham Scarlet*, and other hybrids of *R. arboreum.*

Of late years, however, crosses have been made with the best of the *Sikkim* and *Bhotan* species and hybrids of *R. catawbiense*, with the result that we now have a race of shrubs combining the hardiness of the latter species with the size of flower, colour, and fragrance of the former.

Rhododendrons rank amongst the most showy and useful of evergreen flowering shrubs, and rightly so, especially when one remembers that the flowering season extends over a period of six months. In exceptional seasons it is possible to have them in flower from September to July.

Culture. — Although Rhododendrons can be grown in soils ranging from grey sand to heavy retentive loams, undoubtedly the most suitable is that of a peaty nature. Districts in which the Scotch Pine luxuriates will be found to suit Rhododendrons admirably. In selecting a situation for planting either in beds, masses, or as single specimens, the conditions under which they thrive and grow naturally should always be borne in mind. One must also remember that the hybrid Rhododendron is really a "manufactured" plant, the greater percentage being grafted on seedling stocks of *R. ponticum.* This species thrives in moist soils and shady situations, and therein lies the whole secret of success, namely, plenty of moisture and partial shade. The latter condition is absolutely necessary if we wish to obtain the very best results as regards growth, and also to bring out the colour of the flowers to perfection. The positions selected should be thoroughly prepared by trenching the ground at least deep enough to break the hard layer of "pan" which is generally present in peaty and sandy soils.

Rhododendrons will repay, by their increased vigour and size of flowers, for fairly liberal manuring. It is a good plan to apply a mulch of decayed cow-manure, when obtainable, one autumn, and the following season to skim over the surface lightly, say about 3 ins. deep, burying in the remains. Failing this, a sprinkling of some approved fertiliser, lightly forked in, will be most beneficial.

An abundant supply of water is, as above mentioned, necessary, more especially as the flowers are opening. When the flowering season is over and growth completed, this is not so important, as rather drier conditions are then more beneficial than otherwise.

All old flower trusses and seed-pods should be removed at the earliest opportunity, not only for appearance sake, but also to relieve the plants of any undue strain.

Propagation. — This may be effected either by seeds, layering, or grafting; the latter process is generally adopted by nurserymen, the most suitable months being January and February. It is not necessary to deal here with the ways and means of grafting, as this falls to the lot of so few gardeners; what concerns us most is how to obtain the best results with the means which we have at our disposal.

Layering is best done in early autumn, when the season's growth is completed. All that is necessary is to secure with strong pegs some of the lower shoots of the variety selected for propagation, covering with 2–3 ins. of good peaty soil. In two or three years the layers should be sufficiently rooted to be removed from the parent plant and either set in nursery-beds, or in their permanent positions.

Seedling Rhododendrons.—Seeds may be sown on well prepared beds in cold frames during February or March, slightly covering the seeds with sharp sand and keeping well shaded until germination takes place. This is not recommended as a general practice, since the results are somewhat uncertain, and, moreover, the process is rather slow. In extreme cases twenty-five years has been known to elapse between the time of seed-sowing and the flowering of the resultant plants.

Rhododendron Species.—In addition to the hybrid and other Rhododendrons named in our selection of varieties, there are a great many species and varieties of species which are of considerable importance in the garden. Their numbers have been greatly augmented within recent years by the introduction of many new species from China. As a rule these last are not yet obtainable from nurserymen, and it has thus been thought wise to omit them from this edition. The species described below are generally of American or Himalayan origin, and as a rule should not be planted in fully exposed positions, since they thrive best in the shelter of, but not under trees. They vary so greatly in size according to age and locality that the heights given are only very approximate. The culture of the species is practically the same as that already outlined. For hybrid species see nurserymen's catalogues, and for the very numerous synonyms see the *Kew Hand-list of Trees and Shrubs.*

Rhododendron Anthopogon. — Bluish-white flowers in March. Height, 1–4 ft.

R. arboreum.—White, crimson, and other coloured flowers from March to May. Height, 10–25 ft.

R. barbatum.—Crimson flowers in April and May. Height, 6–40 ft.

R. brachycarpum. — Yellow or cream flowers in May. Height, 3–8 ft.

R. californicum. — Rose-purple flowers in June. Height, 3–8 ft.

R. campanulatum.—Lilac flowers in April. Height, 6–12 ft.

R. campylocarpum. — Sulphur flowers in June. Height, about 4–8 ft.

R. catawbiense.—Rosy-white and other coloured flowers in July. Height, 3–6 ft. Several of its varieties might be grown.

R. caucasicum.—Yellow or pale pink flowers in August. Height, 1 ft.

R. ciliatum.—White flowers in April. Height, 2 ft.

R. cinnabarinum. — Orange-red flowers from April to May. Height, 6–10 ft.

R. cinnamoneum.—Whitish flowers from April to May. Height, 4–8 ft.

R. Cunninghami (Syn. *Cunningham's White*).—White flowers in April. Height, 2–7 ft.

R. dauricum.—Purple flowers in February. Height, 2–3 ft.

R. decorum.—White or lilac flowers in June. Height, 2–4 ft.

R. Falconeri. — White flowers spotted with purple in May. Height, 6–25 ft.

R. ferrugineum (ALPINE ROSE or ROSE DES ALPES).—Pink or white flowers from May to July. Height, 1–3 ft.

R. formosum. — White flowers tinged with rose in April. Height, 3–6 ft.

R. Fortunei.—Rose flowers in May. Height, 6–20 ft.

R. fulgens.—Blood-red flowers in May and June. Height, 4–6 ft.

R. grande (Syn. *R. argenteum*).—White flowers in March and April. Height, 6–20 ft.

R. griffithianum (Syn. *R. Aucklandii*).—White and other coloured flowers in April and May. Height, 4–10 ft.

R. hirsutum (ROSE DES ALPES).—Pink and white flowers from May to July. Height, 1–2 ft.

R. Hodgsoni.—Rose flowers from May to June. Height, 8–20 ft.

R. Hookeri. — Crimson-scarlet flowers in June. Height, 8–15 ft.

R. kamtchaticum. — Rose-purple flowers in July. Height, 1 ft.

R. Keysii.—Brick-red flowers in July. Height, 2–20 ft.

R. lapponicum. — Red-purple flowers in July. Height, 6 ins.

R. lepidotum.—Yellow or purple flowers in May and June. Height, 2–6 ft.

R. Luscombei.—Rosy-lilac flowers in May or June. Height, 6–10 ft.

R. Maddeni.—White flowers from June to August. Height, 6–8 ft.

R. maximum.—Rosy-white flowers in July. Height, 6–20 ft.

R. Metternichii.—Rose flowers in April. Height, 3–8 ft.

R. myrtifolium. — Lilac-purple flowers in May. Height, 1–2 ft.

R. niveum.—Lilac or purple flowers in May. Height, 3–8 ft.

R. nobleanum.—Scarlet and other coloured flowers from February to March. Height, 6–10 ft.

R. nudiflorum (PINXTER FLOWER).—Pink and white flowers in April. Height, 3–4 ft.

R. Nuttalli. — White flowers in May. Height, 6–20 ft.

R. ponticum.—Purple and other coloured flowers in May. Height, 6–12 ft. Several of its varieties might be grown.

R. praecox.—Rosy-lilac flowers in February and March. Height, 2–6 ft.

R. punctatum (deciduous).—Rose flowers in May and June. Height, 2–6 ft.

R. racemosum.—Rosy-lilac flowers in March. Height, 1–2 ft.

R. serpyllifolium.—Rose flowers in May. Height, 2 ft.

R. Shilsoni. — Crimson-scarlet flowers in May. Height, 6–15 ft.

R. sinense.—Yellow flowers in May. Height, 3–6 ft.

R. Smirnowi.—Purple and scarlet flowers in May. Height, 3–10 ft.

R. Thomsoni.—Crimson flowers in June. Height, 6–15 ft.

R. triflorum.—Pale yellow flowers in May and June. Height, 4–6 ft.

R. viscosum (SWAMP HONEYSUCKLE).—Pink flowers in May and June. Height, 2–4 ft.

R. Wilsoni.—Pink and purple flowers in May. Height, 2–4 ft.

R. yunnanense.—Rosy-lilac flowers in April, sometimes spotted white. Height, 3–9 ft.

SELECTION OF VARIETIES.

The selection which follows is naturally limited, since to describe all the hybrids would need a book as large as this Dictionary itself. As it would only confuse the ordinary gardener to attempt to give the parentage of the varieties, also the synonymous names under which they exist, this data is omitted. All those described below are quite distinct, and are among the very finest in cultivation. Excepting the very earliest kinds, all are quite hardy throughout England and Wales. The varieties described are selected from a collection of over six hundred distinct sorts, and are, we think, best considered under their respective months of blooming.

JANUARY AND FEBRUARY: *R. Christmas Flower.* — Blush-white flowers, splendid if pot grown. Height, 3–4 ft.

R. Jenny Lind. — Pale pink flowers, with chocolate spots. Height, 4–6 ft.

R. nobleanum.—Bright red flowers. Height, 3–4 ft.

R. Sunrise.—Pale red flowers, with a white centre. Height, 3–4 ft.

MARCH AND EARLY APRIL: *R. altaclerense.* — Bright purplish-rose flowers. Height, 4–5 ft.

R. Baron Osy.—White flowers, with a chocolate blotch. Height, 3–4 ft.

R. bodartianum. — Fine white flowers, with dark red spots. Height, 4–6 ft.

R. Gabriel Leibig. — Pale rose flowers, deeper at the edges. Height, 4–6 ft.

R. Handsworth Early White.—White flowers, with pale green spots. Height, 3–5 ft.

R. Jacksoni.—Pale rose flowers. Height, 3–4 ft.

R. Julius Schame.—White flowers, with chocolate spots. Height, 3–5 ft.

R. Mme Scarlet.—Bright rosy-red flowers. Height, 3–5 ft.

R. Mme Wagner.—White-centred flowers, with pink edging. Height, 4–6 ft.

R. Prince Camille de Rohan.—Pale rose flowers, with a dark blotch and crimped edges. Height, 4–6 ft.

R. Professor Reichenbach.—Bright rose flowers and a neat bushy habit. Height, 3 ft.

R. Staatsdame Van Massenbach.—Rose flowers, with chocolate spots. Height, 3 ft.

LATE APRIL: *R. August Van Geert.* — Purple flowers in large trusses. Height, 4–6 ft.

R. British Queen.—White flowers, with pale pink spots. Height, 4–5 ft.

R. Lancashire Witch. — White flowers on which is a heavy chocolate blotch. Height, 4–6 ft.

R. maximum triumphans.—Crimson-scarlet flowers. Height, 3–5 ft.

R. russellianum. — Deep rose flowers. Height, 5–8 ft.

R. Viola. — Pale lilac flowers changing to white. Height, 3–5 ft.

EARLY MAY: *R. Broughtonii.*—Deep rose flowers, lightly spotted. Height, 6–8 ft.

R. cinnamoneum Cunninghami.—White much spotted flowers. Height, 6–8 ft.

R. Comte de Gomer. — White-centred flowers, with a rose edge. Height, 3–4 ft.

R. George Hardy.—Very fine pure white flowers, sparsely spotted. Height, 6–8 ft.

R. Grand Arab.—Dark crimson flowers. Height, 6–8 ft.

R. Helen Schiffner. — White flowers, lightly spotted. Height, 2–5 ft.

R. J. Fiala.—Blush-white flowers, with a heavy chocolate blotch. Height, 4–6 ft.

R. limbatum. — White-centred flowers, edged with crimson. Height, 4–6 ft.

R. Princess Alice.—White flowers, with green markings and a spreading habit. Height, 3–4 ft.

MID-MAY: *R. Alice.* — Bright salmon-pink flowers. Height, 4–6 ft.

R. Chevalier Felix du Sauvage.—Rosy-red flowers, with a heavy chocolate blotch. Height, 3–5 ft.

R. Cynthia.—Bright rose flowers. Height, 3–6 ft.

R. Mammoth. — Pale mauve flowers, light at the edges. Height, 6–8 ft.

R. Manglesii. — White flowers tinged with pink at the edges. Height, 6–8 ft.

R. Memoire de Dominique Vervaene.—White flowers, shaded lilac with heavy chocolate blotch. Height, 4–6 ft.

R. Mrs E. C. Stirling.—Light pink self-coloured flowers. Height, 5–7 ft.

R. Mrs Frank Taylor.—White-centred flowers, edged with bright red. Height, 3–5 ft.

R. Prometheus.—Bright crimson flowers. Height, 4–6 ft.

R. Queen of the West.—Dark mauve flowers. Height, 6–8 ft.

R. Sir Neville Chamberlain.—White-centred flowers, edged with rose, and with a heavy chocolate blotch. Height, 5–7 ft.

R. The Bride.—White flowers, with green spots. Height, 4–6 ft.

LATE MAY: *R. Amphion.*—White-centred flowers, with pale mauve edge. Height, 4–6 ft.

R. bylsianum. — White-centred flowers, edged with scarlet. Height, 3–5 ft.

R. Doncaster.—Brightest crimson flowers. Height about 3–5 ft.

R. F. B. Hayes.—White flowers, with very distinct dark blotch. Height, 4–6 ft.

R. John Walter.—Rich crimson flowers. Height about 4–6 ft.

R. Mdlle Marie Van Houtte.—White flowers with bronze and gold markings on the upper petals, and lightly tinged with pink at the edge. Height, 5–7 ft.

R. Michael Waterer.—Fine dark crimson flowers. Height, 4–6 ft.

R. Mrs Isaac Davies.—White flowers, heavily marked with chocolate. Height, 4–6 ft.

R. Pink Pearl.—Very fine pink flowers. Height, 6–8 ft.

R. Princess Mary of Cambridge.—Pale mauve centre, with darker edge. Height, 4–6 ft.

R. Sappho.—White flowers, with dark purplish blotch. Height, 6–8 ft.

R. Stanley Davies.—Deep crimson flowers. Height, 4–6 ft.

EARLY JUNE: *R. Baroness Schroeder.*—White flowers, with chocolate spots. Height, 4–6 ft.

R. fastuosum flore pleno.—Fine double mauve flowers. Height, 6–8 ft.

R. Kate Waterer.—Bright pink flowers spotted with yellow, and with a white blotch on the upper petals. Height, 4–6 ft.

R. Lady Clermont.—Dark crimson flowers, with a heavy black blotch. Height, 6–8 ft.

R. Lady Mosley.—White flowers, shaded with lilac and with bronze spots. Height, 5–7 ft.

R. Mme M. Chasselas Laulat.—White flowers, edged with lilac and lightly spotted. Height, 4–6 ft.

R. Mme Marcel Moser.—Light crimson flowers. Height, 6–8 ft.

R. Mrs R. S. Holford.—Salmon-pink flowers. Height, 6–8 ft.

R. Nellie Moser.—Light pink-spotted flowers. Height, 4–6 ft.

R. papilionaceum.—White flowers, with bronze markings. Height, 4–6 ft.

R. Purity.—Pure white flowers. Height, 4–6 ft.

R. T. H. Kekewich.—Deep purplish-crimson flowers. Height, 4–6 ft.

MID-JUNE: *R. Bruce Finlay.*—Dark red flowers, with a black blotch. Height, 4–6 ft.

R. Duchess of Connaught.—White flowers, with a heavy yellow blotch. Height, 3–5 ft.

R. Eclipse.—Dark plum-coloured flowers, with bronze markings. Height, 4–6 ft.

R. Gomer Waterer.—Very fine white. Height about 4–6 ft.

R. Helen Waterer.—Crimson-edged flowers, with light centre. Height, 4–6 ft.

R. James Nasmyth.—Bright rose flowers, with heavy chocolate blotches. Height, 4–6 ft.

R. Lady Hillingdon.—White flowers, shaded with violet. Height, 6–8 ft.

R. Lord Powerscourt.—Crimson flowers, with heavy black blotches. Height, 4–6 ft.

R. Lord Roberts.—Rich crimson flowers. Height about 3–5 ft.

R. Mme A. Moser.—Pale mauve flowers, with a heavy yellow blotch. Height, 6–8 ft.

R. Mrs Tritton.—Carmine-edged flowers, with a lighter centre. Height, 4–6 ft.

R. Mrs W. Agnew.—Pale rosy-pink flowers. Height, 4–6 ft.

LATE JUNE AND EARLY JULY: *R. Beauty of Bagshot.*—White flowers, with distinct bronze markings. Height about 4–5 ft.

R. C. S. Sargent.—Bright purple flowers. Height about 5–6 ft.

R. Decorator.—White semi-double flowers, shaded with lilac, and with bronze markings. Height, 6–8 ft.

R. J. H. Agnew.—Fine pale pink flowers, with a dark blotch. Height, 6–8 ft.

R. J. J. Moser.—Dark crimson flowers, with a heavy black blotch. Height, 4–6 ft.

R. Joseph Whitworth.—Intense crimson purple flowers. Height, 4–6 ft.

R. Lady Annette de Trafford.—Pale rosy-pink flowers, with a dark blotch. Height, 4–6 ft.

R. Lady Clementine Mitford.—Rose-pink flowers, with a dark blotch. Height, 4–6 ft.

R. Lady Clementine Walsh.—White-centred flowers, changing to pale rose at the edge Height, 3–5 ft.

R. Lady Mary Compton.—White flowers, with a yellow blotch. Height, 6–8 ft.

R. Mme Jules Porges.—Lilac flowers, with heavy chrome-yellow blotches. Height, 6–8 ft.

R. Mrs Mendel.—Bright satiny-pink flowers, with bronze markings. Height, 4–6 ft.

Fragrant Rhododendrons.—We cannot conclude without a brief reference to some of the best hybrids which emit a pleasing scent. We recommend the following, all of which are quite hardy:—

R. Duchess of York.—Salmon-pink flowers, marked with yellow and green, in early June. Height, 3–5 ft.

R. Duke of York.—Dull rose flowers, with a darker blotch, in early June. Height, 3–4 ft.

R. H. M. Arderne.—Rich rose flowers, with a darker blotch, in mid-May. Height, 3–5 ft.

R. Helen Paul.—Pale rose flowers, suffused with yellow, in mid-May. Height, 3–4 ft.

R. kewense.—Large pearly-white flowers, in early May. Height, 3–5 ft.

R. Lady Thistleton Dyer.—Rich salmon-rose flowers, with a darker blotch, in early May. Height, 3–5 ft.

R. Mrs Arderne.—White flowers, shaded with lilac, in early June. Height, 3–5 ft.

R. Mrs Webley.—Light rose flowers, with a dark blotch, in early June. Height, 6–8 ft.

R. Profusion.—Pale rose flowers, with a light centre, throughout May. Height, 3–5 ft.

R. Sir Charles Butler.—Pearly-white flowers, with a yellow centre, in early May. Height, 3–5 ft.

C. N. & S. A.

Up-to-date Selections.

Rhododendron Anne.—Pink.

R. arboreum nigrescens.—Crimson.

R. Benikiren.—Salmon.

R. Betty.—Pink.

R. carneum.—Pink.

R. chasmanthum.—Blue-purple spotted ochre.

R. Countess of Derby.—Pink, spotted carmine.

R. Dalhousiæ.—Yellow and green.

R. Delight.—White.

R. Embley Pink.—Pink.

R. euchaites.—Red.

R. Fortune's Triumph.—Pink, spotted carmine.

R. Galloper Light.—Salmon-rose, spotted deeper.

R. Harry Mangles.—A splendid sort.

R. hippophæoides.—Early blue.

R. indica Charme de Noel.—Double blush-pink, half-hardy.

R. indica Etoile de Belgique.—Half-hardy double red.

R. indica Triumph.—Half-hardy double rose.

R. John Jennings.—Crimson.

R. Keiskei.—Dwarf evergreen yellow.

R. Keleticum.—Lilac, spotted red.

R. Kernick Gem.—Pink, darker spots.

R. Kurume Kirin.—Dwarf pink.

R. Lady Rosebery.—Pink.

R. Leonardslee Cream.—Cream and purple.

R. leucapsis.—White and yellow.

R. Linley.—Pink, spotted carmine.

R. Linley Sambourne.—Pink, carmine markings.

R. Loderi Sir Edmund.—Pink.

R. Luna.—Cream and rose.

R. Magog.—Scarlet, reddish foliage.

R. Mrs W. C. Slocock.—Yellow flushed rose.

R. Mother of Pearl.—Pink, becoming cream.

R. Muriel Messel.—Pink.

RHODODENDRON BUG.—See *INSECT PESTS.*

RHODODENDRONS: TOP-DRESSING FOR.—See *TOP-DRESSING.*

RHODOTYPOS.—For the best species see *SHRUBS.*

RHOPALOSTYLE.—For the best species see *PALMS.*

RHUBARB (*Rheum Rhaponticum.* Nat. Ord. Polygonaceæ).—This is one of the easiest of all crops to grow; in fact it is largely owing to the accommodating nature of the plant that we so seldom find others than professional growers devoting anything approaching the proper attention so useful a crop deserves. Any out-of-the-way corner is thought by many to be good enough for this, yet those professionals whose position justifies their opinion carrying some weight agree that no crop in the garden is likely to give more profitable return for good treatment than this; and as the quality of the sticks is largely determined by the cultivation the plant receives, one well-grown stick having more value than half a dozen weak ones of a tough and stringy nature, this course is advised wherever practicable.

Culture.—New beds may be formed by planting single eyes taken from old shoots any time from January until the end of March, perhaps the best time for making these being just previous to the crowns breaking into new growth. Whenever possible select a good open situation for the crop as far away from the shade or drip of overhanging trees as can be managed, and if the bed is to remain undisturbed for a number of years, or where strong crowns for forcing are wanted, trenching of the soil instead of ordinary digging should have preference. During this process well-decayed manure should be freely mixed with both the lower and upper spit of soil.

Not less than 3 ft. should be allowed between the rows and about 2–3 ft. between the plants.

Good strong portions of old roots containing but a single eye are preferable to those carrying several weak ones; these should be planted firmly in the ground with the eyes barely covered with soil; and after planting little or no attention will be needed until the shoots begin to push up, after which the hoe should be kept in constant use between the rows and water freely applied during dry weather.

GATHERING.—No pulling must be attempted the first season after planting, and only a very limited number of sticks taken during the second, but where liberal doses of strong liquid manure can be poured over the bed, this should be done throughout the second period of growth. Where this treatment is given, the crowns will be strong enough for forcing the following winter, or if left undisturbed may be freely drawn upon for use the next summer.

From Seed to Forcing.—Rhubarb may easily be raised from seed sown in light soil any time during early spring, care being taken to keep the beds free from weeds. Seed may also be sown in heated houses or frames and the seedlings pricked out into beds of finely sifted soil; but as the seed rarely produces plants true to type, the majority being of inferior quality, this method of increasing one's stock is rarely adopted, and is not recommended.

Rhubarb may be forced into growth during the winter months by taking up the strongest crowns and packing them closely together in boxes, or on the floor of a warm greenhouse. Complete darkness and plenty of moisture ensures a rapid and highly coloured growth, the use of tepid water or weak liquid manure being advisable after the crowns burst into growth.

Forced Rhubarb may also be had from plants growing in the open air, by simply covering the strongest crowns with large pots, baskets, boxes, or chimney pipes, these being afterwards covered with nearly fresh horse manure or a mixture of manure and leaves. The period between the time of covering up and the pulling of fair-sized sticks is entirely governed by the amount of material placed around the first coverings, or the period of the year when forcing is attempted.

Varieties.—The following are splendid sorts for garden culture and forcing. The variety *Crimson Winter* or *Everbearing* given below is specially useful:—Crimson Winter or Everbearing, Daw's Champion, Early Champagne, and The Sutton.

F. R. C.

RHUBARB.—See *RHEUM* and *WATER GARDEN: PLANTS FOR THE.*

RHUS.—See *POISONOUS PLANTS* and *SHRUBS.*

RHYNCOSTYLIS.—See *ORCHIDS.*

RIB GRASS (*Plantago lanceolata*).—See *PLANTAGO.*

RIBBON FERN (*Pteris serrulata*).—See *FERNS AND FERN GARDENING.*

RIBES.—For the best species see *CLIMBING AND TRAILING PLANTS* and *SHRUBS.*

RIBWORT PLANTAIN.—See *WEEDS.*

RICE GRASS (*Leersia oryzoides*). — See *LEERSIA.*

RICHARDIA.—See *ARUM LILIES.*

RICINUS (CASTOR OIL PLANT. Nat. Ord. Euphorbiaceæ).—This is a noble large ornamental-leaved plant of majestic appearance, and is an annual of rapid growth. Seed should be sown in warmth about March, and each seed sown in a separate small pot to prevent injury to the roots. The plant can also be used for sub-tropical gardening, and a good rich loam produces the finest growth. Temperature required, 40–50° F.

Greenhouse Species. — *Ricinus Africanus.* — Large green foliage. White flowers from May to September. Height, 2–6 ft.

R. cambodgensis.—Best dark leaf. Green flowers from May to September. Height, 1½–3 ft.

R. communis major (CASTOR OIL PLANT). — Green flowers from May to September. Height, 1½–5 ft.

R. Gibsonii.—Dark purplish stem and foliage. Green flowers from May to September. Height, 1½–5 ft.

R. macrocarpus.—White flowers and stem, also light green leaves. Flowers from May to September. Height, 1½–5 ft.

RIDDLES.— See under SIEVES in *GARDEN APPLIANCES.*

RIDGE CUCUMBERS.—See article on *CUCUMBERS: OUTDOOR.*

RIDGING.—See ROUGH DIGGING AND RIDGING in *SOIL CULTIVATION.*

RIGHT TO PRUNE HEDGES: LAW AS TO.—See *GARDENING LAW.*

RIGID BUCKLER FERN (*Nephrodium rigidum*).—See *FERNS AND FERN GARDENING.*

RINGING.— See under LAYERING in *PROPAGATION OF PLANTS.*

RIVER BIRCH (*Betula nigra*). —See *TREES.*

RIVER SAND.—See *SAND.*

RIVERBANK GRAPE (*Vitis vulpina*). See *CLIMBING AND TRAILING PLANTS.*

ROAD SAND.—See *SAND.*

ROBBERS.—See *GARDEN ROBBERS.*

ROBERTSONIA.—Now included in the genus *SAXIFRAGA.*

ROBIN'S PLANTAIN (*Erigeron bellidifolius*).—See *ERIGERON.*

ROBINIA.—For the best species see *TREES.*

ROCAMBOLE.

The bulbs of this are used for flavouring purposes, but are not often required. The culture is the same as that of *GARLIC*, which see.

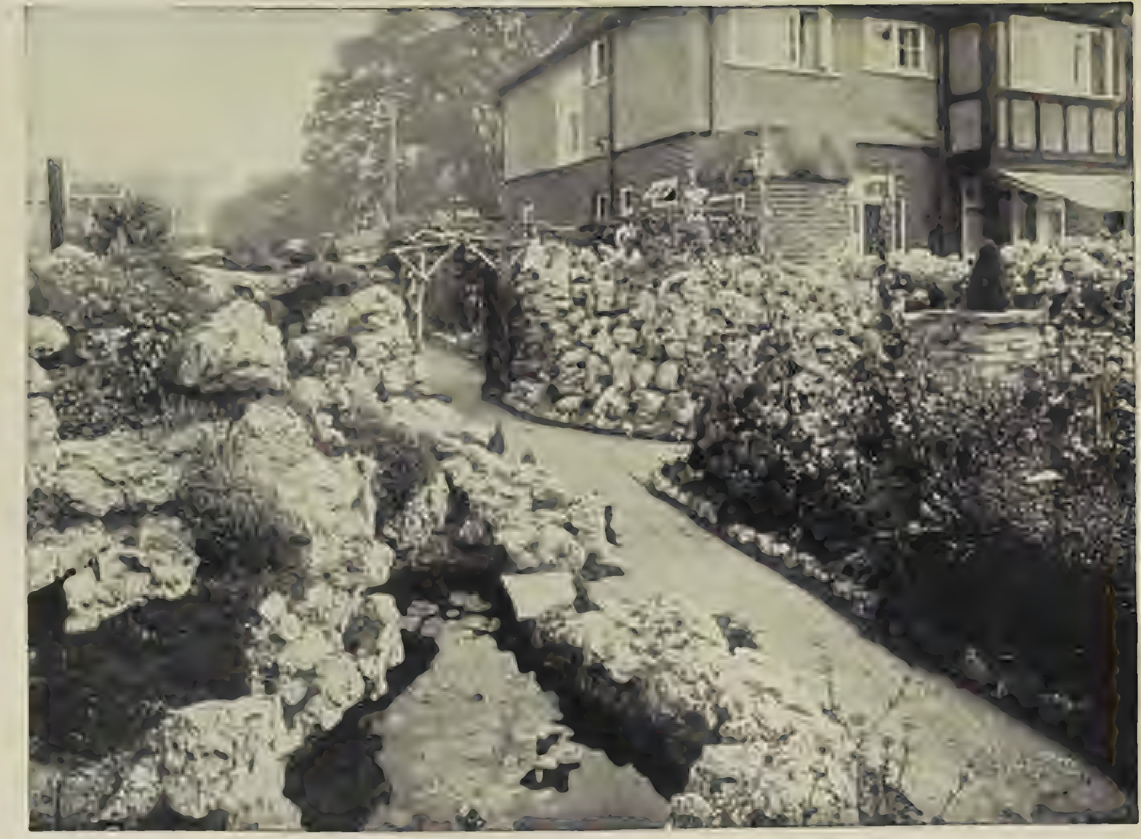
ROCK ABELIA (*Abelia chinensis*).—See *CLIMBING AND TRAILING PLANTS* and *SHRUBS.*

ROCK AND ALPINE PLANTS DISLIKING LIME.—See *LIME-HATERS.*

ROCK BANKS.—See *BANKS.*

ROCK BORDERS.

The present writer well remembers a correspondence in a horticultural newspaper respecting *Undesirable Plants in the Rock Garden.* This correspondence lasted for several months, and it was interesting to see the various views which were expressed. The view held personally was that very few plants were really unsuitable or undesirable in the rock garden, but that a good many of the more rampant subjects were extremely suitable for what is known as the rock border. In the present notes we propose, first, briefly to deal with the making of rock borders, and then to suggest a few subjects which are quite suitable for them.



A ROCK GARDEN

Making the Border.—The making of rock borders is a far more simple task than is the construction of a rock garden. The building of a proper rock garden is hard work indeed, and needs a certain amount of skill, as well as an aptitude for fitting stones together. Not so the rock border. All that is necessary can be done by any gardener who has an eye for the natural lie of stone. The first thing to do is to dig the proposed rock border over to the depth of 2 ft., and thus to ensure that the drainage is sufficiently great to carry off surplus water. Some light leaf-soil, old mortar rubbish, or similar material should be dug into the border if the soil is at all heavy, and some old hotbed manure if the mould is light. As to the stones, any stones suitable for rock garden building are more or less suitable for the rock border. See article on *Rock Garden : Making a.*

Regarding the setting of the stones we may mention that they may be let into the ground in almost any direction provided that they are not perched up on end. As a lady friend of ours said, " Stones perking out of the ground in an upright position look absurd," and certainly a rock border with stones set on end looks highly unnatural. We prefer to use stones which are somewhat rectangular in shape—with the length greater than the breadth. The stones are then let into the ground at a slight angle, in the direction of their length, and groups of them are let in at approximately the same angle to imitate the natural dip of a bed of rock. Other groups should dip in other directions, again to imitate nature, for out in the country two or three dips in different directions may often be seen within a few yards of each other, due to what geologists know as " faulting." The great mistake when making a rock border is not to set the stones in the ground firmly enough. Plants cannot thrive amongst loose material, a fact which should be borne in mind by every lover of flowers. The best time for making rock borders is between November and the middle of March, and the ideal time for planting is early in February, provided that the weather is suitable. Seeds of rock plants may be sown any time from April onwards, and the only after culture needed by rock borders is the keeping of them free from weeds, and the annual dressing of them with light leaf-soil or rotted manure.

Some Suitable Subjects.—When we come to consider the question of suitable subjects for rock borders we are literally amazed by the number available. Herbaceous plants such as Erigerons, Heleniums of the dwarf kind, and indeed many similar plants ranging in height from 1 ft. to 18 ins., will do better in the rock border than in the herbaceous border, although they may not be true rock plants. Frequently in town gardens, where the soil is somewhat sour, plants will fail if grown in the ordinary way, but if grown in the rock border made with limestone (not too much stone being used for the purpose), they will thrive and flower profusely.

The first subject that occurs to us is found in the genus Achillea. *A. argentea* and *A. rupestris* flower in the summer and bear white flowers, and are very suitable, though they are only about 6 ins. high. Some of the taller Achilleas are also good. *Æthionema coridifolium* is a pink-flowering plant blooming in June and August. Height, 8–12 ins. This, with other Æthionemas, is a successful plant. Most suitable, indeed, are the Ajugas. These are considered too rampant for the rock garden, as they spread by underground roots. *Ajuga genevensis Brockbanki* is a blue June flowering species, and is about 8 ins. in height.

We need hardly refer to the extraordinary value of the perennial Alyssums as rock border plants. *A. saxatile* in its two varieties, both yellow, will produce a show of glorious colour if large patches of it are planted in the rock border. *A. argenteum* is a little taller, and is also eminently suitable. These Alyssums range about 6–12 ins. in height. Arabis, too, is a well-known rock garden plant, which is too rampant for the tastes of some. Grown in a rock border, however, among plenty of stones its ardour is not checked to any great extent, and its double white flowers, with the pink blooms of *Arabis aubrietioides*, are too lovely to dispense with. These plants range about 3–8 ins. high.

Alpine Asters are also useful for the rock border, but Aubrietias are far and away ahead of them. The glorious variety *Fire King*, with its red April-borne blooms, the princely purple of *Dr Mules*, and the soft rose-pink of *Moerheimii*, are at the worst wonderfully attractive plants. Many Campanulas are also suitable. *Campanula carpatica*, for instance, a plant of about 1 ft. high, and that glorious little plant *Campanula muralis*, are both blue-flowering subjects which will do well in the open rock border. The latter averages about 3–6 ins. in height.

Cerastium Biebersteinii and *C. tomentosum* are, however, probably the most perfect rock border plants of all. Their silvery-grey foliage and pure white blooms make them distinctly attractive. In the summer months the whole of the plants are covered with a sheet of white flowers, and hence they are known by many people as SNOW IN SUMMER. Many of the Dianthi, Drabas, with Edraianthus (Syn. *Wahlenbergia*) and Geraniums, are also good.

Our next plant of high order of merit for this purpose is found in the Helianthemum, often known as the Sun Rose. The various varieties of *Helianthemum vulgare* are rich in gorgeous colours, and many a bright spot in a long rock border will be found if Helianthemums are planted. Iberis or the Perennial Candytuft, Linarias, especially *Linaria pallida*, Lithospermums, and *Lychnis alpina*, are most desirable rock border plants. Of special merit, however, is *Nepeta Mussini* or Catmint, except where cats are numerous. In such cases Catmint should be banned, for the quadrupeds will make their resting-place on one's beautiful rock border and completely spoil the plants.

Alpine Phloxes, Primulas, and Saponarias are also good, and of the genus Saxifraga there are many suitable types. The taller Saxifrages of all sections are exceedingly useful, and many of the dwarfer sorts, which are easy to grow, may also be commended. Of the first *Saxifraga Fortunei*, *longifolia*, *mutata*, and *peltata* are good, while of the latter section such as *Apple Blossom*, *Cherry Trees*, *Elizabethae*, *oppositifolia*, *Red Admiral*, and *Wallacei* may be mentioned. Most of the taller Sedums, Sempervivums, and Silenes are also suitable.

This by no means exhausts the vast number of plants which are available, for, as mentioned earlier, their name is legion. We must, however, mention two more subjects before closing, namely, Veronicas and Vincas. Of the first, such sorts as *Veronica gentianoides*, *prostrata*, and *saxatilis*, which are violet and blue in colour, may be mentioned, while *Vinca minor*, with its pretty blue, purple, and white colours, is quite indispensable.—E.

ROCK CEDAR (*Juniperus tetragona*). See *TREES.*

ROCK CRESS. — See *ARABIS* and *CRESS.*

ROCK-CRESS, PURPLE.—See *AUBRIETIA.*

ROCK ELM (*Ulmus racemosa*).—See *TREES.*

ROCK GARDEN BULBS.

The effectiveness of the rock garden can be greatly enhanced by the use of bulbous and tuberous-rooted plants, many of which come into bloom early in the year, and in advance of the ordinary rock garden subjects. The ground can be carpeted with dwarf creeping plants, through which, if the growth is not too dense, the bulbs will push their way, flower, and die back till the following season. No plants are of easier culture; they will thrive in any good, light soil, such as is usually to be found on the rockery, and merely require to be planted from 2 to 5 or 6 ins. deep, according to the size of the bulb. Crocuses, however, should be planted very shallow.

Autumn-flowering Bulbs. — Colchicum in variety—leaves do not appear till spring; *Crocus asturicus, C. iridiflorus, C. longiflorus* (Syn. *C. odorus*), *C. medius, C. ochroleucus, C. pulchellus, C. Salzmanni, C. sativus* (the source of Saffron), *C. speciosus, C. s. Aitchisonii, C. Tournefortii, C. zonatus; Cyclamen africanum* (Syn. *C. macrophyllum*), *C. cilicium, C. europaeum, C. neapolitanum* (Syn. *C. hederaefolium*), *C. n. album; Leucojum autumnale; Scilla autumnalis, S. a. japonica; Sternbergia lutea, S. macrantha.* All these plants are of dwarf habit, the tallest being the Colchicums.

Winter-flowering Bulbs. — *Anemone apennina, A. blanda, A. fulgens; Colchicum Decaisnei; Crocus ancyrensis, C. biflorus, C. hyemalis Foxii, C. Imperati, C. Sieberi, C. tommasinianus, C. vitellinus; Cyclamen cilicium, C. Coum; Eranthis hyemalis;* Galanthus in variety; Hepatica (Syn. *Anemone Hepatica*) in variety; *Iris alata, I. Bornmülleri* (Syn. *I. Danfordiae*), *I. persica, I. reticulata* and varieties, *I. Sindpers, I. unguicularis* (Syn. *I. stylosa*), *I. Vartani; Muscari azureum* (Syn. *Hyacinthus azureus*) and varieties; *Narcissus Bulbocodium* and *N. minor minimus.* These plants are all of dwarf habit, and bloom at varying periods between December and early March, much depending on the nature of the season, and the shelter and aspect they enjoy. Under favourable circumstances many of the bulbs included under the heading of Spring-flowering will also bloom before winter is over.

Summer-flowering Bulbs.—*Allium Moly* (height, 1 ft.), *A. neapolitanum* (height, 15 ins.), *A. ostrowskianum* (height, 6 ins.); *Anemone coronaria* in variety (height, 1 ft.), *A. hortensis* (Syn. *A. stellata*) in variety (height, 6 ins.), *A. nemorosa* in variety (height, 6 ins.), *A. ranunculoides* (height, 6 ins.); *Bulbocodium vernum* (height, 6 ins.); Chionodoxa in variety (height, 4 ins.); Crocus in several species; *Cyclamen ibericum* in variety (height, 3 ins.), *C. repandum* (height, 3 ins.); Erythronium in many species and varieties (height, 3–9 ins.); Fritillaria in variety (height, 9–18 ins.); *Iris bucharica* (height, 12 ins.), *I. caucasica* (height, 6 ins.), *I. cristata* (height, 3–4 ins.), *I. Heldreichii* (Syn. *I. stenophylla*) (height, 4 ins.), *I. orchioides* (height, 12 ins.), *I. Sisyrinchium* (height, 6 ins.), *I. Warleyensis* (height, 12 ins.); *Leucojum vernum* (height, 4–6 ins.); *Milla* (Brodiaea) *uniflora* (height, 6 ins.); Muscari (height, 6 ins.);

Narcissus cyclamineus, N. juncifolius, N. triandrus (all about 9 ins. high); *Puschkinia scilloides* (height, 6 ins.); Romulea in variety (height, 6–9 ins.); *Scilla bifolia, S. italica, S. sibirica, S. unifolia, S. verna* (all about 3–6 ins. high); Sparaxis in variety (height, 6 ins.); *Sternbergia fischeriana* height, 6 ins.); *Tulipa Batalinii, T. Clusiana, T. persica, T. primulina* (height, 6–12 ins.).

These plants flower at varying times from March to May or early June. Those mentioned by no means exhaust the list.

Summer-flowering Bulbs.—*Allium pulchellum* (height, 9 ins.), *A. p. flavum* (height, 9 ins.); *Anomatheca* (Lapeyrousia) *orientalis* (height, 6–9 ins.), *A. grandiflora* (height, 9 ins.); Brodiaea in variety (height, 9–18 ins.); Calochortus in variety (height, 6–24 ins.); *Oxalis floribunda* (height, 8 ins.), lift in autumn; and *Tritonia crocata* (height, 6 ins.).—W. J. C.

ROCK GARDEN : Foliage Plants for. See *Foliage Plants for All Purposes.*

ROCK GARDEN : Making a.

Rock gardening appeals with singular force to the amateur either as a hobby or as a pastime. It can be carried out in limited space, the initial outlay is never burdensome, and the maintenance in after years does not run to a fraction of what bedding plants cost; the display is infinitely greater and the pleasure more satisfying, while the practical work inseparably associated with rock plants affords the most healthy relaxation from business work and worry.

The Site of the rock garden is of first importance. Wherever possible, choose a sunny position in the open, away from high walls and large trees. Some shelter to the north and east is desirable, but this can be supplied by planting a few hardy shrubs of moderate growth near to the rock garden to act as a screen against cutting winds. The objection to tall trees is twofold: the branches cause shade and drip in wet weather, which is fatal to good plants; and the tree roots soon find the good soil, and in a few years will exhaust it. High walls act in a similar way, by preventing a free circulation of air. They also cut off much of the natural supply of rain.

Having decided upon the site, we now consider the form or shape of the rock garden. In this direction taste has great latitude, for a rock garden may be anything from a low, almost flat, series of undulating beds or mounds, up to terraced hills of soil studded or built up with rock-masses many tons in weight. As the latter require specialised treatment in the hands of experts, I shall confine myself to material that any amateur can handle by himself. The low style of rock garden is as good as any, so far as plant growth is concerned; its only drawback being that it does not lend itself to spectacular effect. Boldness and a certain amount of rugged aspect, such as we seek to reproduce in miniature hills and gorges, can only be secured by stone built up to form a rocky mass. In this way the size and height of our rock garden is largely determined by local conditions: if stone is scarce and we wish to use it to the greatest advantage, then the low type of rock garden is best for our purpose; with plenty of stone this limitation does not arise. It is quite an erroneous idea to suppose that large quantities of rock are necessary or desirable; many rock gardens suffer from a surfeit. Even when stone is purchased, a few well-chosen pieces are far better than unlimited quantities of small waste, that calls for endless labour and ingenuity in building.

The outline of the rock garden, that is, the point of contact, all round it, at ground level, should be irregular; avoid curves and sweeps that are mathematically correct, and do not make a continuous margin of stone; but make the intervals of stone and soil regular and give each bay or projection a touch of character of its own. Then, the weight and balance of the rock garden must be kept in view when setting out. In small gardens it is never advisable to attempt anything too elaborate; simplicity should be the key-note throughout. If one point is selected to carry the weight, let it be treated boldly on simple lines; if few stones are available use them where they will be most effective. Suppose the ground is flat, narrow, and of moderate length, then the highest point may either be the centre or one of the ends. If the first arrangement is followed, raise one end about two-thirds the height of the centre, and the other end about half the height of centre. In the other arrangement, by placing the highest point at one end, a second point two-thirds the height of this can be raised at the other end, and the interval between treated as valley, slope, or boulder-strewn incline. On steep or undulating ground it is much easier to secure a natural effect with rock-work, and the balance is also simplified, because here, the highest point should incline in the direction of the natural rise of the ground: the point I particularly want to emphasise is, strive in all building and arrangement to make the rock garden appear as an outcrop or natural feature of the position, and not as a forced growth having no sympathy with its surroundings.

And now, a word as to stone; if this can be had locally by all means use it, unless it is of a nature that crumbles readily on exposure, or magnesian limestone. In this latter case its whiteness will always be an eyesore, so it is best avoided. When stone has to be purchased, then good limestone or sandstone are best; it is immaterial whether the latter is white or red as it very soon weathers and greens over, and loses its new appearance. Artificial material in the way of cement or concrete should be avoided as far as possible; it is really only useful in binding small stone together to form a promontory or projecting point: when exposed to the air it sooner or later suffers from the action of frost.

Building.—The actual building of the rock garden should invariably begin at ground level, and the first stones should have their lowest edge concealed. Make them always to dip or incline toward the main body of soil in which they rest: at times this may be arranged to give a flat surface, when they can be used as stepping stones to gain access to the plants; at other times a diagonal tilt to right or left may be more effective; but whatever inclination is set up in the lower stones, observe this sequence throughout and a definite stratification will result. Avoid the regular effect of spiky pinnacles as shown in Fig. 1, where the stones appear as if they had been spaced off by footrule, and their most glaring surfaces exposed in each case. In Fig. 2 a better arrangement is illustrated; the stones follow a definite line, the ends in the soil are concealed and firmly bedded, and no amount of treading upon them is likely to loosen or dislodge them. The plants also are better placed, the larger growth in particular being used to half-veil the stones or accentuate their height. In any arrangement similar to this, a quantity of smaller stone can be worked in, and the larger pieces spread over a greater surface; but with small stone only a quarter to one-third of it can be exposed; at least two-thirds of it must lie buried in the soil and be made absolutely rigid, as no good alpine will grow satisfactorily when stones are loose or cockle whenever hand or foot is placed against them.

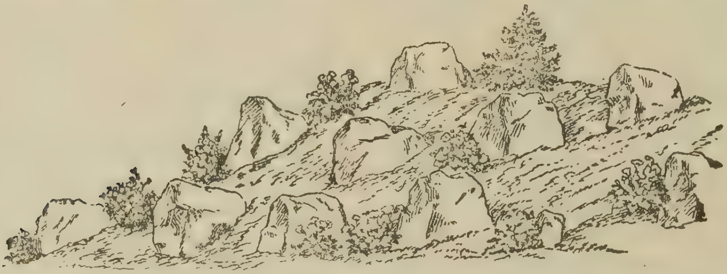


FIG. 1.—A spiky arrangement; rocks and plants at too regular intervals.

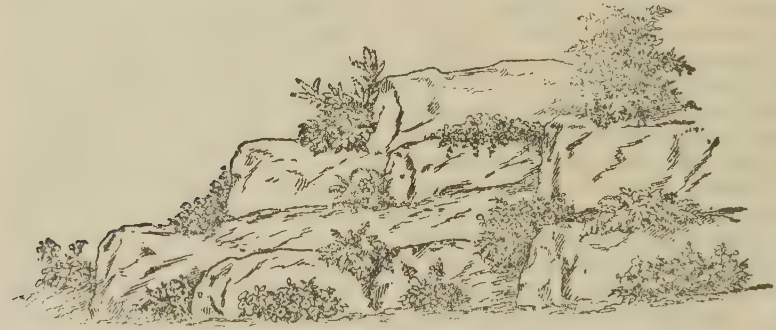


FIG. 2.—A more tolerant arrangement; rocks arranged in better series, or layers, and plants better placed. Note the lower edge of stone and also one end are both concealed.

A suggestion for dealing with small stones of more or less even thickness is shown in Fig. 3. The main objection to such an arrangement lies in its wall-like face, but this could be largely destroyed with careful planting: its merit consists of the abundance of crevices it furnishes for the better class of alpine plant life; the stones, as I have shown them, lie rather close together, but this can easily be varied by making the joints wider, occasionally using a small chip of stone to keep them apart; provision is made for a small path half-way up. Rocks arranged in this fashion are best planted as they are laid. Whatever arrangement of laying stone is followed, the idea of forming crevices for the choicer plants should be kept well in the foreground. Different aspects must also be provided, and in this way the requirements of various plants satisfied. In Fig. 4 is shown an arrangement that must at times be resorted to in building a promontory with small stone, so as to secure a bolder effect than usual, and also to raise the ground from being too severely flat; the method of holding the stone together should be carefully noted, and in building, pack all spaces between the stones with soil and ram firmly, planting as the stones are laid. This method answers admirably on the north side of the rock garden, and the vertical fissures that result make ideal positions for Ferns, Haberlea, Primulas, and Ramondias. This idea last commented upon is useful in another direction, for if water can be laid on, and the faintest trickle allowed to fall over the topmost stone, a delightful dripping will result. To catch the water a small basin or pool can be formed of concrete, or it may be made watertight with well-puddled clay. Perhaps the happiest idea would be to carry a small channel or rivulet from the dripping well pool, and make the larger pool more to the south of the rock garden, as this would give better promise of more sun light for Nymphaeas, and the better class of flowering bog and water plants. The pool and channel should be excavated to rather more than the required depth, and have a lining of cement or clay; the edges of the pool should be shelved, on which soil is placed before the water is introduced. Marsh and bog plants will then succeed around the margins, and in the water the better class of aquatic plants will find suitable conditions. Some stone may be added to the water area, and so make the transition from rock to water garden less abrupt.—T. S.

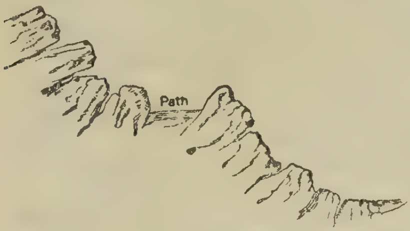


FIG. 3.—The natural home of alpines is in fissure and crevice—small stones arranged in this way provide both, in endless variety and always well drained.

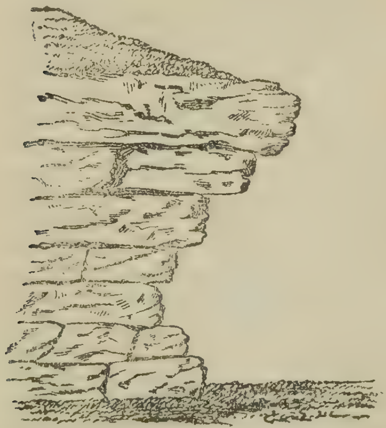


FIG. 4.—Method of arranging stones to form a bold point or to lift the ground sharply.

NOTE.—In practical work use this method to form a north aspect; the overhanging stones are more troublesome to plant if placed in the sun.

ROCK GARDEN: MANAGEMENT OF.

When the rock garden has been made the work is not over. It has to be "managed" also, otherwise it will soon be smothered and the more delicate plants either entirely killed or completely spoilt. This management of the rock garden is of such importance that we feel we must devote an article to it.

Suitable Soil.—Our first consideration must be the supplying of suitable soil to the pockets which are to contain the various plants.

Undoubtedly a light loamy soil is

suitable for a great number of rock plants. Generally speaking, the more gritty it is the better. This grit is supplied by crushed limestone or granite, and the limestone is greatly to be preferred. There are, however, some exceptions, notably two or three Dianthi, Ranunculi, Silenes, Drabas, and *Campanula alpestris*, with *Saponaria lutea*, which dislike lime in any form, and for these granite grit is the right material to use. The amount of grit varies with plants. Some of the smaller Androsaces, etc., like about one-fourth or more of the compost to be grit, while others, such as the stronger tall-growing Saxifrages, do wonderfully well in ordinary loam with little or no grit in it.

Of the rock plants which like a peaty soil probably the most notable are the Gentians. Most of the rock garden Primulas also like it, several of the Campanulas, Lithospermums, Daphnes, and a number of others too numerous to mention. Large works have been published on Rock Gardening, and doubtless readers will find complete details of plants which are peat lovers in them.

Site for Plants.—After getting a suitable soil the next thing to do is to choose a suitable site. It is, for instance, little use planting *Primula bulleyana* on a high and dry ridge, as it would certainly die, so fond is it of water; nor is it at all desirable to plant any of the choicer Saxifrages, Sedums, and Sempervivums in damp, boggy holes, for they would soon perish. It is equally undesirable to plant the pretty *Oxalis enneaphylla* or *Primula pulverulenta* in the hottest, sunniest spots of the rock garden or to plant Dianthi or Silenes in the densest shade. Readers desirous of finding out the best sites should pay a visit to the Royal Gardens, Kew, the R.H.S. Gardens at Wisley, or the St. John's College Gardens, Oxford. There they will be able to study every variety of rock plant and see it in its best site. Naturally, to give a complete list here would be impossible.

Rock plants which need much moisture include the following, among hosts of others: Orchis, Ourisia, Primulas, *Ranunculus aconitifolius*, and *Saxifraga aizoides*.

Planting Out.—Above all things, rock plants should be set in their positions firmly. The idea that they will grow if just popped in anyhow is absolutely absurd, and this loose planting is responsible for more losses than is anything else. In the case of planting in definite pockets, a hole should be taken out with a trowel and the plant put in (not deeper than it was originally set), so that there can be no possible hollow beneath its base. The soil all round it should be made very firm; this will encourage the formation of new roots.

In the case of planting in clefts between rocks extra care is needed to see that there is no hollow for air beneath the plant's roots. The cavity is first filled with moderately fine, gritty soil, this being rammed in so as to fill it completely. Then a little is scraped out, the tiny plant put in, some soil being pushed in after it, and then its position is fastened by inserting a small angular stone to wedge it. Needless to say, planting ought never to be done in very dry nor in very wet weather. In the first case, the plants cannot get established through lack of the needful amount of moisture, and in the second, the soil is apt to cake when pressed hard, and so becomes too stiff for the formation of new roots. We think that all rock plants should be labelled, so that there is no doubt as to what they are.

Weeding of the Rock Garden.—Even in the first year after the making of the rock garden other things, namely, weeds, will start a-growing in it. We consider that it is advisable never to let the weeds "get ahead." If the rock garden once gets really weedy an enormous amount of labour will have to be bestowed upon it. The alternative is to have a regular round of the rock garden about once a fortnight, pulling up every weed showing then. This does not take long. Half an hour will see it done in the case of a small rock garden, and even if the garden be one of fair size about an hour will see the work through. One hour per fortnight is not much, and it will save days and days of work later.

Weeding, if done at all, should be done carefully, for if it be carelessly done choice plants may be irrecoverably injured. An old kitchen fork makes an almost ideal tool for weeding in the rock garden. A small basket should always be slung on your arm as you weed, otherwise little heaps of weeds are apt to get forgotten. It is a great mistake to leave small weeds in as being too small to do any harm. By the end of the fortnight they may have grown large and seeded; then you will wish you had not despised them, and had taken them out.

Trimming and Clearing Up. — After they have flowered there is hardly a rock plant which is not benefited by being trimmed up. All the dead flowers should first of all be clipped off, and then long straggly shoots trimmed back. Some rock plants, notably *Arabis albida, Alyssum saxatile, Aubrietia deltoidea,* and *Cerastium tomentosum,* require severe treatment in this direction, otherwise they overrun the rock garden, spoiling themselves and smothering other choice subjects. It is a good plan to keep plants such as the Ajuga and Cerastium away from extra choice plants altogether, for the roots of these two plants penetrate some distance and rob other plants of food.

At the end of the autumn there should be a general clearing up. All fallen leaves, decayed leaves of plants, dead flowers, and weeds should be most carefully removed, and the plants mulched with grit or light loamy soil. Labels should, if necessary, be renewed. Loose stones should be reset, dead plants renewed, and the whole rock garden made spick and span for the winter. Plants such as the Androsaces, the smaller and less hardy Sedums, Saxifrages, and Sempervivums, should be covered with a small piece of glass during the winter, otherwise they will die.

Propagation of rock plants is dealt with in separate articles. The same general rules in this or in any other form of propagation hold good. Rock plants can also be raised by sowing seeds on the surface of pockets of fine soil in the spring, the seedlings being pricked off and planted out elsewhere when large enough to handle. This is fully discussed in the article *Rock Plants from Seeds.*—E. T. E.

ROCK GARDEN SHRUBS.

Whether the rock garden be large or small, space should certainly be found for a few shrubs. The number suitable for the purpose is extensive, and affords, by the diversity of the various subjects, scope for very effective planning. Some appeal by the beauty of their flowers, others by their foliage, and others have the additional recommendation of bright-coloured berries, often at a time when flowers are altogether absent. They range from a few inches to several feet in height, and include some of prostrate habit, which are invaluable for rambling over stones and down rocky slopes; others which form spreading bushes; and yet others of compact, upright growth. Their cultivation presents little difficulty, most of them thriving in ordinary, well-drained soil, though, as with other plants, there are some which prefer peaty soil. In the following list, which is by no means exhaustive, those which need special treatment are indicated. The best of these bearing attractive flowers are referred to in our article on *Flowering Shrubs*, and in some cases the flowers are succeeded by pretty berries.

With reference to the heights given in brackets after the name, it should be remembered that in many instances it takes a considerable time for the plant to attain to these dimensions, and in some cases it can be kept to any desired height by pruning.

Abelia chinensis (height, 4–8 ft.).
Abies excelsa pumila (height, 1 ft.); *A. e. pygmaea* (height, 1 ft.).
Acer palmatum in variety (height, 3–20 ft.).
Amygdalus nana (height 3–4 ft.).
Andromeda in variety [1] (height, 1 ft.).
Arctostaphylos Uva-ursi,[1] trailer.
Astragalus Tragacantha (height, 1 ft.).
Azalea Hinodigiri,[1] and *A. mollis* [1] *in* variety (height, 1–4 ft.).
Berberis in variety (height, 1–12 ft.).
Bruckenthalia spiculifolia [1] (height, 6–9 ft.).
Bryanthus empetriformis [1] (height, 1 ft.).
Buddleia variabilis prostrata, trailer.
Caryopteris Mastacanthus (height, 2–3 ft.).
Cassinia fulvida (height, 2–3 ft.).
Cistus, all varieties which like hot, dry positions (height, 2–4 ft.).
Cornus canadensis [2] (height, 6 ft.).
Corokea Cotoneaster, twisted branches (height, 2–10 ft.).
Cotoneaster horizontalis, prostrate (height, 2 ft.); *C. microphylla* (height, 4 ft.); *C. thymifolia* (height, 1 ft.).
Cydonia japonica, C. Maule (height, 3 ft.).
Cytisus Ardoini (height, 6–9 ins.); *C. decumbens*, prostrate (height, 6 ins.); *C. kewensis*, prostrate; *C. purpureus*, prostrate.
Daphne blagayana, trailer (height, 6–9 ins.); *D. Cneorum* (height, 1 ft.); *D. rupestris* (height, 2–9 ins.).
Erica carnea,[1] *E. c. alba* [1] (height, 6 ins.); *E. mediterranea hybrida* [1] (height, 1–2 ft.).
Erinacea pungens (Syn. *Anthyllis Erinacea* (height, 9 ins.).
Fabiana imbricata [1] (height, 2 ft.).
Gaultheria procumbens [1] (height, 6 ins.).
Genista andreana prostrata, trailer; *G. dalmatica* (height, 2–3 ft.); *G. humifusa, G. pilosa*, trailer (height, 2 ft.); *G. praecox* (height, 4 ft.); *G. tinctoria fl. pl.* (height, 2 ft.).
Hedera Helix conglomerata, non-climbing dwarf Ivy.
Helianthemum in variety (height 9–24 ins.).
Juniperus communis aurea (height, 2 ft.); *J. c. hibernica compressa* (height, 6 ins.); *J. Sabina tamariscifolia* (height, 1–2 ft.).
Lavender Munstead Dwarf (height, 1 ft.).
Ledum palustre [1] (height, 1–1½ ft.).
Menziesia (Daboëcia) *polifolia* [1] (height, 2 ft.).
Olearia Haastii (height, 3–4 ft.).
Ozothamnus rosmarinifolius (height, 1 ft.).
Pernettya mucronata [1] in variety (height, 1½–2 ft.).
Perovskia atriplicifolia (height, 3 ft.).
Pinus aristata (height, 1 ft., though it eventually reaches 40 ft.).
P. sylvestris globosa [1] (height, 1–3 ft., but eventually reaches 80–100 ft.).
Potentilla fruticosa (height, 2–3 ft.).
Retinospora (Cupressus) *filicoides* (height, 1–4 ft.); *R. obtusa nana* (height, 1–4 ft.); *R. plumosa aurea* (height, 1–2 ft.).
Rhododendron ferrugineum (height, 1–2 ft.); *R. praecox* (height, 1–2 ft.); *R. racemosum* [1] (height, 1–2 ft.).
Rhodothamnus Chamaecistus (height, 9–12 ins.).
Salix sericea pendula, prostrate.
Santolina Chamaecyparissus (height, 12–18 ins.).
Spartium junceum (height, 6 ft.).
Taxus baccata Dovastoni pendula (height, 2 ft.).
Thuya occidentalis Spaethii (height, 2–3 ft.).

---

[1] A peaty soil is required by these, or at any rate one free from lime.

[2] This likes a shady site and peaty soil.

Veronica in variety (height, 6–18 ins.).
Viburnum Opulus nanum (height, 18 ins.).
Zenobia speciosa[1] (height, 1½–2½ ft.).

W. J. C.

ROCK JASMINE (*Androsace villosa Chamaejasme*).—See *ANDROSACE.*

ROCK MADWORT (*Alyssum saxatile*). See *ALYSSUM.*

ROCK NAVELWORT.—A name applied to *Omphalodes Luciliae.*

ROCK PINK (*Dianthus petraeus*).—See *DIANTHUS.*

ROCK PLANTS: DISEASES OF.—See *DISEASES OF ROCK PLANTS.*

ROCK PLANTS DISLIKING LIME.—See *LIME-HATERS.*

ROCK PLANTS FOR ALL PURPOSES.—With so vast a number of subjects suitable for the rock garden, it is not surprising that marked differences are to be observed in their requirements and habits, and these differences afford opportunity for the flower-lover to make choice of those plants that are likely to accommodate themselves to the prevailing conditions in his garden, or, on the other hand, enable him to secure a wide diversity by providing for the individual predilections of each sort. Thus he may have plants that flourish in sun or in shade, in sharply drained or in constantly moist soil; in peat or in loam, or in the moraine; and though the majority flower in spring, when the rock garden is at its best, it is possible also to have a bright display in the summer and autumn. Furthermore, many of the plants are amenable to culture under glass, either in pots or on the indoor rockery, in which case they are usually earlier, and of purer and brighter colours. The cultivation of rock plants is dealt with elsewhere in this volume: the lists following indicate some of the principal subjects, and the purposes for which they are best adapted. There are, of course, many species and varieties not here enumerated, and additions to the number are constantly being introduced.

Rock Plants for Autumn Blooming.—The following are among the best:—

Acaena microphylla (dwarf creeper).
Androsace lanuginosa (height, 4 ins.).
Astilbe simplicifolia (height, 6 ins.).
Aubrietia in variety (height, 3–6 ins.
Callirhoë involucrata (height, 6 ins.); *C. lineariloba*, trailing (height, 9 ins.).
Campanula portenschlagiana (height, 9 ins.); *C. pulla* (height, 3 ins.); *C. pusilla* (height, 4 ins.); *C. Profusion* (height, 6 ins.).
Ceratostigma plumbaginoides (height, 6–9 ins.).
Coreopsis rosea (height, 12 ins.).
Coronilla cappadocica (trailing); *C. varia* (trailing).
Cyananthus lobatus (height, 3 ins.).
Cyclamen cilicium (height, 4 ins.); *C. europaeum* (height, 3 ins.); *C. neapolitanum* (height, 4 ins.); *C. n. album* (height, 4 ins.).
Dianthus Greipsii (height, 2 ins.); *D. neglectus* (height, 3 ins.).
Epilobium obcordatum, trailing (height, 3 ins.).
Erigeron mucronatus (height, 3 ins.).
Fragaria indica, trailing (height, 6 ins.).
Gentiana asclepiadea (height, 18 ins.).
Geranium in variety (height, 6–24 ins.).
Geum Heldreichii and varieties (height, 9–18 ins.).
Gypsophila cerastoides (height, 4 ins.).
Horminum pyrenaicum and varieties (height, 9–12 ins.).
Hypericum Coris (height, 9 ins.); *H. repens* (height, 4–6 ins.).
Inula ensifolia (height, 9 ins.).
Linaria alpina (height, 6 ins.); *L. Cymbalaria*, creeper (height, 2 ins.); *L. pallida*, creeper (height, 4 ins.).
Lithospermum prostratum (height, 4 ins.); *L. p. Heavenly Blue* (height, 4 ins.).
Lysimachia Henryi (height, 6 ins.).
Nepeta Mussini (height, 12 ins.).
Nierembergia rivularis (height, 3 ins.).
Œnothera caespitosa (height, 6 ins.); *Œ. missouriensis*, trailer (height, 6 ins.).
Omphalodes Luciliae (height, 6 ins.).
Onosma echioides (height, 9 ins.).
Plumbago Larpentae (Syn. *Ceratostigma plumbaginoides*) (height, 12 ins.).
Polygonum affine (Syn. *P. Brunonis*) (height, 6 ins.); *P. vaccinifolium*, trailer (height, 6 ins.).

Potentilla ambigua (height, 4 ins.); *P. nepalensis* (height, 18 ins.); *P. nitida* (height, 6 ins.).
Saxifraga Fortunei (height, 12 ins.).
Sedum Ewersii (height, 4–6 ins.); *S. E. turkestanicum* (height, 4 ins.); *S. populifolium* (height, 12 ins.); *S. spectabile* and varieties (height, 12–18 ins.).
Silene maritima and varieties (height, 4 ins.); *S. Schafta* (height, 4 ins.).
Statice bellidifolia (height, 4 ins.).
Teucrium Chamaedrys (height, 12 ins.).
Thymus carnosus (height, 9 ins.).
Verbena venosa (height, 9 ins.).
Zauschneria californica (height, 12 ins.).

Rock Plants for Bog and Water Gardens.—Any of the dwarfer and more compact subjects mentioned in our article on *WATER GARDEN: PLANTS FOR THE*, may be used successfully for these two purposes.

Rock Plants for Carpeting.—It is sometimes desired to lay a regular carpet in certain parts of the rock garden, and obviously attractive plants are best for this purpose. Of these we recommend the following: *Acaena microphylla, Ajuga reptans, Alyssum serpyllifolium, Antennaria dioica, A. d. hyperborea, A. tomentosa; Arenaria balearica, Cotula dioica, C. squalida; Frankenia laevis, Helxine Solierolii* (likes damp, and is of doubtful hardiness); *Herniaria glabra, Hutchinsia alpina, Hypericum humifusum, Linaria aequitriloba, L. pallida; Lithospermum prostratum, Lysimachia Nummularia*, and its golden-leaved variety; *Mentha Requieni, Mimulus radicans, Nertera depressa* (hardy only in the south, and requiring protection from snow); *Nierembergia rivularis, Prunella grandiflora, Sagina glabra, S. g. pilifera aurea;* Saxifrages of the mossy section, *S. oppositifolia* and others; *Sedum acre, S. anglicum, S. hispanicum, S. maweanum, S. spathulifolium; Sibthorpia europaea, Thymus Serpyllum, Veronica canescens, V. repens*, and *V. Stuarti.*

Rock Plants for Cutting.—We were recently asked to give a selection of suitable rock plants for this purpose. As a matter of fact, suitable subjects are not numerous, but we recommend the following, the heights of which are approximate only, much depending on the treatment:—

Achillea serbica (height, 12 ins.).
Æthionema grandiflorum (height, 12 ins.).
Anthemis biebersteiniana (height, 12 ins.)
Aquilegia caerulea (height, 18 ins.); *A. canadensis* (height, 18 ins.).
Armeria latifolia (height, 18 ins.).
Cheiranthus Allionii (height, 12 ins.); *C. alpinus* (height, 12 ins.).
Cypripedium Calceolus (height, 6–12 ins.).
Erigeron alpinus (height, 12 ins.).
Erysimum in variety (height, 9–12 ins.).
Gerbera Jamesoni[1] (height, 12–18 ins.).
Geum montanum aurantiacum (height, 9–12 ins.).
Heuchera in variety (height, 12–24 ins.).
Iberis correaefolia (height, 9–12 ins.); *I. gibraltarica* (height, 12 ins.).
Macrotomia echioides (height, 12 ins.).
Phlox divaricata (height, 12–18 ins.).
Saxifraga umbrosa (height, 12 ins.).

Many of these plants are equally suitable for cultivation in the border; indeed, if required for cutting they should certainly be grown there, so as not to spoil the effectiveness of the rockery.

Rock Plants for Edging.—Any of the hardier and less aggressive though strong-growing subjects are suitable for this purpose. For selection see article on *EDGING: HARDY PLANTS FOR.*

Rock Plants for Half-shade.—The requirements of most of these plants can be met by giving them a position where they are not exposed to full sun at midday. In the case of the dwarfer subjects a stone on their south side will suffice. The following are the chief: *Adonis vernalis, Androsace arachnoidea,*

---

[1] Protect in winter.

A. carnea, A. Laggeri, A. pyrenaica; Aquilegia caerulea, A. canadensis; Aster alpinus, Campanula pulla, C. pulloides, C. pusilla; Ceratostigma plumbaginoides (Syn. *Plumbago Larpentae*); *Cotyledon chrysanthus,* Cyclamen (hardy species); *Cypripedium Calceolus,* Dryas in variety, *Epigaea repens, Erodium chamaedryoides,*Globularia in variety, *Linnaea borealis, L. canadensis;* Mertensia in variety, Omphalodes in variety; *Ourisia coccinea,* Polygala in variety, Primula in variety (except *P. Balbisii, P. frondosa, P. marginata,* and *P. suffrutescens*); *Rubus arcticus,* Saxifraga, the mossy section, *S. brunoniana, S. erosa, S. Fortunei, S. Geum, S. granulata, S. lilacina, S. mutata, S. nivalis, S. retusa, S. squarrosa, S. Sternbergii, S. Wallacei;* Shortia in variety, Soldanella in variety, *Tanakaea radicans,* and *Viola pedata.*

Rock Plants for Indoor Culture.—Certain of the prettiest rock plants are not hardy in this country, and require the protection of a cold or slightly heated greenhouse in the winter. The chief of these are listed in our article on the *ALPINE HOUSE.*

Rock Plants for Moraines.—The best subjects for this purpose are given in our article on *MORAINE GARDENING,* which see.

Rock Plants for Paved Paths.—Paved paths and the chinks between stone steps, are often unnecessarily bare, whereas they may be planted with dwarf-growing subjects, which greatly enhance the beauty of the garden as a whole. Among plants suitable for this purpose are the following: Acaena in variety, *Achillea tomentosa, Alyssum montanum, Antennaria dioica, Armeria maritima,* Aubrietia in variety, *Calamintha alpina, Campanula muralis, C. pulloides, C. pusilla; Cerastium tomentosum, Cotula dioica, C. squalida; Dianthus deltoides, Draba pyrenaica, Erinus alpinus, Erythraea Massoni* (Syn. *E. diffusa*); *Frankenia laevis, Linaria aequitriloba, L. Cymbalaria; Mentha Requieni, Oxalis corniculata,* Ruta in variety, *Thymus lanuginosus, T. Serpyllum* and its variety *splendens.*

Rock Plants for Rocky Crevices.—Many of the most beautiful rock plants require a cool, moist root-run, while they are impatient of wet about their crowns and on the foliage, especially in winter. The best position for them is in a crevice between stones, where their roots can find the moisture they love, while the rain is thrown off from the crowns. Those with hairy leaves are also benefited by having a piece of glass fixed above them in winter, so that air can circulate freely about them while they are protected from excessive wet. Of these the following are the chief: Acantholimon in variety, Æthionema in variety, Androsace in variety, *Arabis androsacea, Campanula hirsuta, C. tommasiniana, C. waldsteiniana;* Cerastium in variety, *Cortusa Matthioli, Dianthus alpinus, D. a. Atkinsonii, D. caesius, D. Freynii, D. glacialis, D. neglectus, D. nitidus, D. sylvestris;* Draba in variety, *Erigeron mucronatus, Eritrichium nanum, Hypericum tomentosum, Leontopodium alpinum, Lewisia rediviva, Lychnis alpina,* Mertensia in variety, Morina in variety, Noccaea in variety, Onosma in variety, Origanum in variety, *Phyteuma comosum, Primula Allionii, P. Auricula, P. auriculata, P. Balbisii, P. ciliata, P. clusiana, P. hirsuta, P. integrifolia, P. marginata, P. villosa, P. viscosa; Saponaria caespitosa, S. lutea;* Saxifrages of the encrusted section, also *S. Boydii, S. burseriana, S. caesia, S. Elizabethae, S. Grisebachii, S. liliacina, S. marginata, S. rocheliana, S.*

Salomoni, S. tombeanensis, S. valdensis; Sedum in variety, Sempervivum in variety, *Teucrium Polium,* Tunica in variety, and Wahlenbergia in variety.

Rock Plants for Shade.—*Androsace foliosa, Arenaria balearica, Cathcartia villosa, Chrysogonum virginianum, Claytonia asarifolia, C. caroliniana, C. sibirica; Cortusa Matthioli, Cyananthus lobatus;* Dodecatheon in variety, *Eomecon chionantha, Galax aphylla, Haberlea rhodopensis, Hacquetia Epipactis,* Houstonia in variety, *Isopyrum thalictroides, Mitchella repens, Primula Allionii, P. calcycina, P. cortusoides, P. decorum, P. latifolia, P. megasaefolia, P. pubescens alba, P. villosa;* Pulmonaria in variety, Ramondia in variety, and Wulfenia in variety.

In addition to these, Ferns will supply a wealth of interesting species and varieties.

Rock Plants for Spring Blooming.—More rock plants bloom in the spring than at any other time of the year, and to give a complete list would require many columns, and these cannot be spared. Attention is therefore drawn instead to the plants which bloom at the other three seasons of the year, when, as a rule, rock garden flowers are scarce, in order that readers may know what to plant to give a succession of bloom.

Rock Plants for Summer Blooming. — Acantholimon in variety, Æthionema in variety, *Aster alpinus, Astragalus danicus,* Calamintha in variety, *Campanula Allionii, C. carpatica, C. pulla, C. pusilla, C. Raineri, C. tommasiniana, C. waldsteiniana; Cathcartia villosa, Cerastium tomentosum, Claytonia caroliniana, Conandron ramondioides, Corydalis thalictrifolia, Cyananthus lobatus, Cyclamen libanoticum, Dianthus cruentus, D. Freynii, D. Napoleon III., D. neglectus;* Dryas in variety, *Erigeron mucronatus, Erinus alpinus,* Erodium in variety, *Galax aphylla, Gentiana Andrewsii, G. asclepiadea, G. septemfida;* Geranium in variety; *Geum Borisii, G. Heldreichii; Gypsophila repens, Haberlea rhodopensis,* Helianthemum in variety, Heuchera in variety, Jasione in variety, Linum in variety, *Nepeta Mussini, Nierembergia rivularis, Omphalodes Luciliae, Phlox procumbens, Platycodon grandiflorum, Polygonum affine, Potentilla Gibson's Scarlet, P. Miss Willmott; Prunella webbiana, Saxifraga Fortunei, Scutellaria alpina, Sedum acre, S. Anacampseros, S. Ewersii, S. obtusatum, S. populifolium, S. pulchellum, S. rupestre, S. Sieboldii, S. ternatum; Silene maritima, S. Schafta; Teucrium Chamaedrys, T. Marum; Thymus Serpyllum, Verbena venosa, Veronica Bidwillii, V. caespitosa, V. incana;* and *Wahlenbergia Kitaibelii.*

Rock Plants for Sunny Sites.—As by far the greater majority of rock plants succeed best in the sunniest possible site, this should form a guide to their successful culture. It may justly be assumed that if the plants are not in the lists for shade and half-shade a site in full sun is necessary for them, and to give the hundreds of such subjects would be unnecessary waste of space.

Rock Plants for Winter Blooming.—Of rock plants proper it cannot be said that there are any which bloom out of doors in winter, but many of the Saxifrages come early when the season and general conditions are favourable. In sheltered nooks at the foot of the rockery the Christmas Rose will not belie its name, and the fragrant blooms of *Iris alata, I. reticulata,* and others will open in February, while those of *I. unguicularis* may be had from November onwards. But the Irises suggest bulbs, and of these there are fortunately a goodly number which may be employed. (See article on *Rock Garden Bulbs*.) Of course, on the rockery under glass, and in the *Alpine House* (see separate article), it is not difficult to produce a charming display throughout the winter.

Rock Plants Disliking Damp.—The rains of winter injuriously affect many rock plants, which can endure frost unharmed, and which must have air around them at all times. A piece of glass elevated a few inches above them in winter will assist to throw off the superabundant moisture, and bring them safely through the winter. Among those recommended for this treatment are the following: Æthionema, Androsace, *Antirrhinum Asarina*, *A. sempervirens*; *Arabis androsacea*, *Artemisia lanata*, *Asperula suberosa*, *Campanula hirsuta*, *Cerastium alpinum lanatum*, *Corydalis Wilsoni*, Dianthus of tufty habit, Draba, *Eritrichium nanum*, *Helichrysum arenarium*, *Hieracium villosum*, Houstonia, *Hypericum Coris*, *H. tomentosum*; *Leontopodium alpinum*, *Lewisia rediviva*, *Lychnis alpina*, Meconopsis, Onosma, *Papaver alpinum*, *Potentilla villosa*, encrusted Saxifrages, *Teucrium Polium*, Wahlenbergia, and *Zauschneria californica*.

With some of these plants it is sufficient if they are planted on their sides wedged between stones, so that water cannot lodge around their leaves in winter. This is true of the encrusted Saxifrages, and also applies to those which form cushions, and to other dwarf plants with silky or downy leaves.

Rock Plants Disliking Lime.—The chief of these are included with other similar subjects in our article on *Lime-Haters*.

Rock Plants of Rampant Growth.—Where the rock garden is small, and space is limited, it is obvious that plants of very rampant growth are likely to encroach upon their neighbours, and to smother the choicer and slower-growing or stay-at-home subjects. Many, of course, can be kept in check by constant watchfulness, cutting back straggling shoots as they appear; others, which spread by means of underground stems, are not so easily dealt with. They have their good points, and are often of great decorative value; therefore, their inclusion or rejection is a matter for individual judgment. Among rampant growers are the following: Achillea in variety, *Alyssum saxatile*, *Arabis albida*, and its double variety; Aubrietia in variety, *Centranthus ruber*, *Cerastium Biebersteinii*, *C. tomentosum*; *Coronilla varia*, *Dryas octopetala*, *Epilobium nummularifolium*, *E. obcordatum*; *Fragaria indica*, *Gypsophila repens*, *Hypericum repens*, *H. reptans*; *Linaria Cymbalaria* and varieties, *L. pallida*; *Lithospermum prostratum*, *L. purpureo-coeruleum*; *Lotus corniculatus fl. pl.*, *Lysimachia Nummularia*, *Nepeta Glechoma*, *Omphalodes verna*, *Oxalis Acetosella*, *O. corniculata* (annual, which sows itself very freely); *Prunella grandiflora*, *Rubus arcticus*, *Saponaria ocymoides*, *Saxifraga trifurcata* and other mossy Saxifrages, *S. umbrosa*; *Sedum acre*, *Silene maritima*, *Thymus Serpyllum*, and *Waldsteinia fragarioides*.

Rock Plants Requiring Peat.—Androsace in variety (except *A. lactea*, *A. obtusifolia*, and *A. villosa*); *Cathcartia villosa*, Claytonia in variety, *Conandron ramondioides*, *Cortusa Matthioli*, *Cyananthus lobatus*, *Epigaea repens*, *Galax aphylla*, *Gaultheria procumbens*, *Haberlea rhodopensis*, Houstonia in variety, *Linnaea borealis*, Mertensia in variety, *Mitchella repens*, Polygala in variety, *Primula farinosa*, *P.*

floribunda, P. integrifolia. P. intermedia, P. involucrata, P. longiflora, P. minima, P. Portae, P. rosea, P. sikkimensis; Ramondia in variety, *Rubus arcticus,* Shortia in variety—sandy peat and loam or leaf-mould; Soldanella in variety, *Tanakaea radicans,* and Wulfenia in variety.

W. J. C.

ROCK PLANTS FOR ROCKY CREVICES.—See *ROCK PLANTS FOR ALL PURPOSES.*

ROCK PLANTS FOR SEASIDE GARDENS.—See *SEASIDE GARDENS: PLANTS AND TREES FOR.*

ROCK PLANTS FOR SHADE and ROCK PLANTS FOR SUNNY SITES. See *ROCK PLANTS FOR ALL PURPOSES.*

ROCK PLANTS FROM SEEDS.

This, we think, is undoubedly the cheapest and most interesting way of raising rock plants and stocking an extensive rock garden, but it also means that a far longer period must elapse before that garden is replete with and blooming fully with the choicest and best of plants. It has been said that the raising of rock plants from seed is a far more suitable task for the hardy alpine plant specialist than for the ordinary gardener: that may be, but there is no reason at all why the ordinary gardener should not try his hand at this interesting undertaking as well as his specialist brother.

Starting. — If we view the subject generally before starting we find it is full of controversial details. Some authorities say that the seeds should be sown in heat: others that artificial heat is not only unnecessary but very detrimental. Some say that the seed should be sown as soon as it is ripe: we think this point is not important. Yet others say that the soil should be baked in the oven for a lengthy period before sowing the seed, and others, including ourselves, think that this is not at all important. Still others say that rock plants should be sown in a compost nine-tenths of which is grit, and on the contrary other gardeners are of the opinion that such an excessively gritty compost is undesirable.

Sowing the Seed. — Sweeping aside the maze of controversial details we will give our own views on this important and interesting subject. We prefer to sow the seed of rock plants either in very gentle heat in February, or in a cold frame in early March. Shallow boxes or pots are undoubtedly preferable for the purpose instead of sowing the seed directly on to the frame soil-bed. Plenty of drainage of crocks of all sizes is first of all put into the pots or boxes: this is then covered with a little rough compost and filled up to half an inch from the rim with soil passed through an eighth-inch sieve. We do not consider sterilising the soil to be the least necessary provided that old two-year-rotted meadow loam, three-year-old leaf-mould, and clean sharp silver sand—not road sand—are used for the compost. If the soil be sterilised, much of the useful vegetable matter in it which goes so far to producing sturdy plants is lost, and only useless mineral matter remains. This is, of course, our personal view. Other authorities strongly urge that the soil be sterilised to kill weeds and pests, but if old material be used these last should not be abundant. From one-eighth to one-fourth of the compost should be sand according to the natural habitat of the plants. Moraine plants, for instance, require a great deal of grit to germinate satisfactorily, whereas the stronger "meadow" blooming rock plants can do with very little. When the pots or boxes are ready they should be well watered, and then the seed sown upon them very thinly. Seed varies in size, and the usual method of sowing small seed of any kind, namely the mixing of it with ten times its own volume of sand, should be adopted. A firm seed-bed is desirable. If the seed is exceedingly delicate and chary of germination, a layer of sand should be spread over the surface of the soil, as is done in the case of Mimulus, Nemesia, and other small seeds of greenhouse subjects. The seed is then very lightly covered with soil, the pans being covered with brown paper and glass without further watering.

As soon as there is any sign of germination the glass and paper must be removed, and the boxes inured to the light. Watering overhead is apt to be very dangerous, and it is far better to immerse the pots or boxes in tubs of warm soft water till the soil is well moistened. The boxes, etc., should be put close to the glass, and very great care taken to give them plenty of air at all times.

Pricking Off. — When large enough to handle conveniently and before there is the slightest chance of them becoming crowded, the seedlings should be pricked off. We prefer to prick them off into a cold frame and let them remain there for a few months keeping them well watered, rather than put them into pots straight away. The surface of the bed should be freely scattered with limestone chippings, or with granite fragments in the few cases where plants do not like lime. Firm planting is advisable. A distance of 5 ins. from plant to plant is ample. During the hot summer weather, watering and shading are essential.

In September or early October the plants may be lifted and transferred to small pots of similar light sandy compost with plenty of drainage. Firm potting is desirable. The surface of the pots can have grit or chips thrown on it to tend to keep it sweet. Give a good watering after potting, and immediately plunge the pots up to their rims in cinder or coke ashes in a frame. Ventilate freely on fine days but protect from frost. They can be planted out the following spring and will flower later on, but it is best to clip the flowers off in order to conserve the strength for free blooming next year.—E. T. E.

ROCK PLANTS REQUIRING PEAT.— See *ROCK PLANTS FOR ALL PURPOSES.*

ROCK PLANTS IN THE VILLA GARDEN.—See *VILLA GARDENING.*

ROCK PLANTS: TOP-DRESSING FOR.— See *TOP-DRESSING.*

ROCK PURSLANE.—See *CALANDRINIA.*

ROCK ROSE.—A name applied to the genus CISTUS and to *Helianthemum vulgare.* See *CLIMBING AND TRAILING PLANTS* and *SHRUBS.*

ROCK SPEEDWELL (*Veronica saxatilis*). — See *VERONICA: ROCK GARDEN SPECIES.*

ROCK SPRAY.—See the genus COTONEASTER in *SHRUBS.*

ROCK WALLS.— These are referred to in the Editorial Note to our article on *GARDEN WALLS.*

ROCKERIES.

These differ from rock gardens in size and character. Rock gardens are usually large, rockeries small; and, again, rock gardens when properly made always look natural and artistic, while rockeries, however well made they may be, always look quite unnatural and inartistic. There is usually a definite *raison d'être* for a rockery, such as a bank to be supported or an ugly empty corner to be filled, but there is nothing of the kind, or should not, be in the case of a rock garden.

As there is this definite purpose of rockeries, some of the rules of rock garden making may be broken. Stones may be perched end upwards so long as they hold up earth, and no regard need be paid to the bedding marks on the stones. As a rule the stronger-growing rock garden subjects, such as Ajuga, Alyssum, Arabis, Aubrietia, Cerastium, Lithospermum, etc., are the most suitable for rockeries, though they require severely cutting back after flowering to keep them within bounds.

ROCKET (*Hesperis.* DAME'S VIOLET. Nat. Ord. Cruciferæ).—This is a plant highly prized by lovers of the more old-fashioned flowers, and also by modern gardeners who delight in perfumed flowers. Most of the species have a very sweet scent, emanating more especially at night, and a lengthy blooming period. The annual species are omitted as they are hardly worth growing, but species which are biennial will be found described elsewhere in this work, in our notes on *NIGHT-SCENTED STOCK.*

The hardy perennials, which concern us in the present article, are of the easiest cultivation, thriving in ordinary light soil of good quality in a sunny or very lightly shaded site. They are grand for the perennial, herbaceous, or mixed borders and may be used effectively at the back of rock borders to surprise new-comers with scent, which is as a rule scarce in that portion of the garden. Some, especially *H. matronalis,* are splendid flowers for cutting. Propagation may be effected by seeds sown in the usual way in the spring or summer, but the best way is to divide the roots, not in October, November, or March as is usually done (though at times this is quite satisfactory), but to split them up in July and August, keeping them for a few months in the reserve garden after doing this if possible. In the case of the double sorts, however, it is more satisfactory to insert cuttings in light soil about midsummer. Planting may be successfully done, as for all other hardy perennials, in the autumn or spring.

What to Grow.—We recommend the following, but only *H. matronalis* and *H. violacea* are in the *Kew Hand-list of Herbaceous Plants* :—

Hesperis aprica.—This is a pretty dwarf purplish May blooming sort only 6 ins. high.

H. elata.—Syn. *H. matronalis,* which see.

H. excelsa.—This is a delightful early blooming white sort flowering in May, and averaging 1–2 ft. high.

H. matronalis (Syn. *H. elata*).—This is quite the most popular and the best species of all. Nurserymen offer it in various colours, such as purple, pink, red, red-purple, and double white and red, but the type is a single purple. The best varieties include *alba* (single white); *alba plena* (double white); *lilacina plena* (pale double purple); *nana alba plena* (dwarf double white); and *purpurea plena* (dwarf double purple). The double forms are the most important and are grand for cutting. The OLD SCOTCH ROCKET is better than any of the above, but is now very rare. The above varieties and the type bloom freely from early June to late July, and grow about 1 yd. in height.

H. violacea.—This bears violet or blue-purple flowers in May and June, on plants about 1½ ft. high.

ROCKET CANDYTUFTS.—These have been produced from *Iberis umbellata.* See *CANDYTUFT.*

ROCKET LARKSPURS.—These have been produced from *Delphinium Ajacis.* See *LARKSPUR.*

ROCKFOIL.—A popular name for *SAXIFRAGA*, which see. It is also dealt with in *WATER GARDEN : PLANTS FOR THE.*

ROCKWOOD LILY (*Ranunculus Lyalli*). See note at end of *RANUNCULUS*.

ROCKWORK.

Rocks may be studied from several points of view. The petrologist determines the material of which they are composed; the geologist considers their mode of occurrence and origin, and their relations to one another in nature; while the architect and engineer put them to practical uses. From each of these groups of workers we can take some ideas that will be of use for our present purpose. From a practical point of view the engineer has to consider questions of weight, strength, porosity, and durability, all of which are of importance in connection with rockwork. In planning a rock garden we must, of course, first of all get some estimate of the amount (volume or weight) of material required. In their weight (or more strictly, specific gravity) rocks of different kinds vary between wide limits, but those more suitable for rockwork range from 120 to 180 lb. per cubic foot. With an average of 150 lb., a ton of stone therefore measures about 15 cubic ft., that is 5 × 3 × 1 ft. or 3⅓ × 3 × 1½ ft. Figures relating to the crushing strength of different kinds of rocks need not be given here, for the practical gardener will readily see for himself whether any particular material is too soft or friable for use. But it must be borne in mind that certain rocks, for example, shales and shaly limestones, soon break down when exposed to the weather. A point of much more importance than may at first thought appear, is that of porosity. Hard or compact, non-porous rocks, such as granite, basalt, and quartzite, offer little hospitality to plants. On a smooth, polished surface of such rocks even the humblest plants, namely, lichens, cannot find a hold. On a porous rock, however, lichens and mosses insinuate themselves into the pores and crevices with considerable ease, and the same applies to the roots of rock plants. Again, porosity is of importance in enabling the stone to retain moisture. For example, a porous sandstone may absorb as much as 15 lb. of water per cubic foot, or, in other words, 1 ton of stone may hold about 2 cwt. of water, which will measure about 22½ gallons.

We now will continue by giving a few particulars about the various kinds of rock and their uses:—

Limestone.—As is well known, plants may be broadly divided into three classes, namely, lime-lovers, lime-haters (see the article *LIME-HATERS*), and those which are indifferent to lime. It is also well known that virgin soils rich in lime are derived from limestone rocks; but it must be remembered that many other kinds of rocks also contain lime, although not always in a soluble form directly available as a plant food. In limestone the lime is present in the form of carbonate of lime, which is soluble to a slight extent in water containing carbonic acid gas (carbon dioxide). Since carbon dioxide is always present in rain-water, it follows that in the presence of limestone the soil-water carries dissolved lime. Limestone is thus the best material for rockwork when lime-loving plants are to be cultivated.

Rocks of this class vary enormously in their appearance and characters—ranging from white to black in colour, and from chalk to marble in their degree of compactness—in fact, a limestone cannot always be recognised by mere inspection. It will therefore be useful to mention the following simple tests:—

All limestones can be readily scratched with a knife.

They do not scratch glass.

They effervesce briskly in contact with acid (dilute hydrochloric acid is the best to use).

Limestones are abundant in many parts of the country, and suitable material can often be obtained near at hand. The hard and compact *Mountain Limestone* abundant in the North of England is excellent material for rockwork, and there are several others belonging to other geological formations that are equally suitable. As a rule, those belonging to later geological periods (*e.g.* the *Oolites*) are softer and less compact, but suitable material may also be selected from these beds.

Two special kinds of limestone, useful for rockwork by reason of their porous or cellular structure, may be mentioned. *Travertine* is a grey or buff-coloured, more or less honeycomb-like rock, but at the same time is hard and durable. It is typically developed near Rome, and is used in the rock gardens of the Riviera. Similar material is quarried for rockwork at Dursley in Gloucestershire. *Dolomite* or Magnesian Limestone has sometimes much the same appearance as Mountain Limestone, but differs from it in containing magnesium carbonate in addition to calcium carbonate, and in effervescing only with warm acid. This rock is typically developed in the Dolomite mountains of the Tyrol, where a rich alpine flora flourishes, and it is abundant in the north-east of England.

Sandstone. — This ranks with limestone as a material of first importance for rockwork; and is, of course, more suitable for lime-hating plants. Rocks of this class consist of sand grains of the inert mineral quartz bound together by some cementing material, which may be clayey, limy, or irony in its nature. When the cement is calcareous the rock has the same effect on plants as a limestone. Sandstones vary greatly in their appearance and characters, and applying the tests mentioned above under limestone, it will be found that they scratch glass, and that only those with a calcareous cement will show a slight effervescence with acid. Sandstones are of wide distribution, being met with in all geological formations, and suitable material for rockwork can generally be found near at hand.

Coarse-grained sandstones are known as Grits (for example, the *Millstone Grit* of the North of England); and if pebbles are also present Grits become *Conglomerates.* Both are suitable for rockwork.

What to Avoid.—The very hard and compact granite is useful only when it is partially weathered and decomposed, it being then to some extent porous. Quarry waste from near the surface is thus more suitable for rockwork than good quarry stone extracted for building purposes. Slate Rock is usually too compact and fine grained, while the softer shales break up into flakes on exposure to the weather. Basalt also is very hard and compact, and the sombre black colour is scarcely pleasing. At the other extreme is the soft, white Alabaster of the Midlands, which, though often used for small rockeries, is scarcely a suitable material, and the same applies to the softer kinds of Chalk. Blocks of stone from the waste heaps of mines should also be avoided, or at least carefully selected. Here iron pyrites and other metallic minerals may be present, if only in small amounts, and these are readily decomposed on exposure to the weather with the formation of free sulphuric acid and injurious metallic salts. Other materials to be shunned are tree stumps, fused bricks, slags, clinkers, and of course such oddments as pottery refuse, shells, coral, bits of spar, stalactites, etc.

Artificial Stone.—This can often be used with good effect, as seen in some of our London parks; but it should only be employed when natural stone is not available. It is made as concrete with Portland cement, and if suitable small pebbles can be incorporated the result will be hardly distinguishable from conglomerate or coarse grit. It is, however, necessary that the material should not be cast in sharply angular blocks.

On the arrangement of stones in rockwork, see the article *Rock Garden: Making a.*—L. J. S.

ROCKY CREVICES: SUBJECTS FOR.—See ROCK PLANTS FOR ROCKY CREVICES in *ROCK PLANTS FOR ALL PURPOSES.*

ROCKY MOUNTAIN COLUMBINE (*Aquilegia caerulea*).—See *AQUILEGIA.*

ROCKY MOUNTAIN FIR (*Abies lasiocarpa*).—See *TREES.*

RODGERSIA (Nat. Ord. Saxifragaceæ).—Only two species of this genus figure in the second edition of the *Kew Hand-list of Herbaceous Plants.* These, *R. pinnata* and *R. podophylla*, bear rose-pink and white flowers respectively throughout July, and grow up to 1½ yds. in height. They are both useful subjects in perennial and mixed borders, and the second is specially handsome, but requires well staking. They may be grown in the ordinary way for hardy perennials in a sunny spot provided a moist peaty soil is afforded them, and they are easily propagated by seeds sown in the summer or by root division in February or March, during which months they are best planted. Two newer species introduced into general cultivation after the issue of the *Hand-list* are *R. aesculifolia* and *R. tabularis.* Both may be grown on the same lines as indicated above; both bear white flowers from July onwards; and both average about 1 yd. in height.

ROLLERS.—See GARDEN ROLLERS in *GARDEN APPLIANCES.*

ROLLING LAWNS.—See *LAWNS AND THEIR MANAGEMENT.*

ROMAN CHAMOMILE.—See under CHAMOMILE in *MEDICINAL HERBS.*

ROMAN CYPRESS (*Cupressus sempervirens*).—See *TREES.*

ROMAN HYACINTHS and ROMAN AND ITALIAN HYACINTHS.—See *HYACINTH.*

ROMNEYA (Nat. Ord. Papaveraceæ).—Only two species of this are strictly herbaceous, and these in the more exposed northern and eastern districts cannot be said to be quite hardy, inasmuch as they require winter protection, otherwise they may be grown in the usual way for herbaceous perennials in the flower, shrub, or wild garden borders. Of the sorts of which we are now speaking, *R. Coulteri* bears white yellow-centred flowers from July to September, on plants 2–5 ft. in height, and *R. trichocalyx*, a newer species, is similar in its general characters, but is rather better.

See also *SHRUBS.*

ROMULEA (Nat. Ord. Iridaceæ). This is a genus of hardy and half-hardy bulbs, requiring no special treatment beyond that usually bestowed on hardy and half-hardy plants. They prefer a sandy soil rich in humus, and are easily propagated by offsets. The best HARDY sorts include *R. Bulbocodium* and *R. Columnae*, while HALF-HARDY sorts should be represented by *R. clusiana*, *R. Macowani*, *R. monadelpha*, and *R. rosea*. They mostly bear yellow and lilac flowers in May, and average 3–12 ins. high.

ROOF GARDENING.

With modern houses steeply roofed with slates or tiles very little roof gardening, if any, is possible. Nor do we recommend those living in old-fashioned houses to go in for it, as the plants are a good deal of trouble to manage, up above the world as they are. We think roof gardening is a thing of the past; certainly it has no future, and we consider it would be waste of space to give a list of suitable subjects.

ROOT ABSORPTION.—See *PLANT PHYSIOLOGY*.

ROOT CROPS.—See *KINDS OF CROPS*.

ROOT-PRUNING.

Many planters, especially the inexperienced, observe that their fruit trees begin to bear the first or second year after they are planted, but afterwards grow vigorously and become unfruitful. Experienced ones expect this, and act accordingly. The reason is that young trees make an immediate endeavour to attain something like their natural dimensions, after which they settle down to the business of life and bear more or less heavily according to their natural capabilities. The object of root-pruning is to reduce the excessive vigour of growth they acquire after being established for a few years, and restore them to a state of fruitfulness, within reasonable limits of space. The pruning back of the branches will not effect this, but will give rise to stronger growth in future years, owing to the great strength and development of the root system by comparison with the reduced top of the tree. Cordon, bush, and pyramidal trees, intended to be kept within restricted limits, and to bear well, require most frequent attention to root-pruning. Standards and half-standards should be given more room and allowed to grow naturally, till they reach bearing size and age; but even they require root-pruning occasionally, when the fertility and nature of the soil induce them to make much growth, or the roots get down into a wet or uncongenial subsoil.

How to Root-Prune.—In the case of trees three to six years old, the most expeditious method of root-pruning them is to lift and replant them in the same position, after cutting back the long straggling roots and those which penetrate the ground more or less perpendicularly. Use a sharp knife to make clean cuts, removing all damaged roots, but preserving all the fibrous ones possible. If the trees are too crowded the obvious course is to replant them more widely apart.

Trees seven to twelve or more years old should be root-pruned where they stand. Take out a trench 3–5 ft. from the bole of the tree, leaving an undisturbed circle, 6–10 ft. in diameter, so as not to endanger the stability of the tree during windy periods for the first year. Discretion should determine the width of the circle, according to the weight or spread of the head of the tree; but usually 6 ft., would be ample, except in the case of large standards. Light rather than severe root-pruning should receive due consideration. The trench should be sufficiently wide to allow for freedom in working, and sufficiently deep to enable the operator to excavate the soil from beneath the ball, in order to cut roots that go down deeply. All the strong roots that come into the trench should be cut; if too thick for a knife they should be cut with a saw, as well as those which penetrate the soil perpendicularly, and the cut ends smoothed with the knife. This completed, the soil should be replaced gradually beneath the tree, ramming it hard with a stick as the work proceeds, unless the feet can be used conveniently. It is a good plan to fill in the upper part of the trench with a compost consisting of good loam, a little leaf-mould, some old mortar, broken finely, and a fair sprinkling of wood ashes. This should be trodden down quite firmly and covered with the remaining soil. The cut roots will ramify in this compost, producing plenty of fibres, which are conducive to early fruitfulness.

When standards and half-standards make a quantity of young wood, and fruit but sparingly, root-pruning will often correct them. Bear in mind, however, the weight of the head, especially if unduly exposed to wind, and determine the width of the circle, to be on the safe side. In the case of very large trees it is a good plan to root-prune only half of the tree the first year, and complete the work the following one. The wind will have least effect upon the tree if the circle is outlined, one-fourth of the trench dug on the north-east side, and the other fourth on the south-west side. This is the best plan, though the opposite directions would answer as well. The trees so operated upon should be marked or numbered, so that the two remaining portions may be completed the following autumn.

Wall trees are root-pruned on similar principles, the only difference being that the trench is taken out in the form of a half-circle at a proper distance from the trunk of the tree.

October is the best month for root-pruning generally, because the wood is ripened, the trees are going to rest, and the autumn rains have sufficiently moistened the soil to prevent the premature withering of the leaves. It is occasionally done during September in the cooler northern parts of the country, and may be done during November, if need be, but the middle course is best. The benefits of the operation will not make themselves felt the first year, but during the second, as the flower buds are formed in the autumn.—J. F.

ROOTERIES.

These are similar to *Rockeries* (see separate article), only tree roots are used instead of stones. They harbour a lot of insect pests, especially woodlice, and are not to be recommended. Any of the stronger-growing subjects named in the above-mentioned article are equally suitable for the present purpose, and look very well when the roots have been nearly covered.

ROOTS: Manures for.—See under Crop Requirements in *Manures.*

ROOTS OF PLANTS: Their Functions.

It seems to me that there are very few gardeners who realise what the true functions of the roots of plants are, hence it will be well to explain the matter in a few words.

Roots are not given plants merely as a means of holding the leaves and stems upright, but they are there to feed the plants. The roots are really mouths as well as limbs of plants—a fact not generally appreciated.

A foolish idea has got round that plants feed entirely through their leaves, and that the only function of the roots is to steady the plants in the ground and supply them with water. With some plants experiment has shown that this idea is true, but there are indeed very, very few plants in which this is the case. In most cases the roots act as a mouth, through which food dissolved in water passes, to be made with the carbon dioxide of the air into leaf, stem, and fruit.

Much more care ought to be taken than is taken to keep the soil in a suitable condition for the roots of plants to draw food from. If the soil is too wet, as well as acid and sour, the roots decay, and hence they are not able to perform their function of feeding the plants. That is why on such a soil our crops turn sickly and die; they cannot get enough food from it, and though the food may be present in quantity it is in an unsuitable form.

If the roots are to perform this function of drawing large quantities of food from the soil, more than the usual care should be taken in planting to spread them out properly. The usual haphazard method of sticking plants in anyhow with their roots all twisted, is far from good, and should never be followed by anyone who wants his plants really to thrive. Study of the nature of the roots of plants, though it may be so humble a pastime, is well worth doing, and will amply repay in success later on.—E.

ROSA.—See *Rose*. See also under Rose, French, in *Medicinal Herbs*.

ROSE (*Rosa*. Nat. Ord. Rosaceæ).

So important is this, the Queen of Flowers, that we do not feel able to do justice to it in a single article, and are thus devoting several to it. The classes and garden varieties are dealt with in our article on *Rose Classes*; the chief diseases it is subject to are dealt with in our article on *Rose Diseases*; its chief pests will be found, with remedies, in the article on *Insect Pests*; planting forms the subject of a special article on *Rose Planting*; pruning is dealt with in our notes on *Pruning Roses and Shrubs*; the best species are described in the article on *Rose Species*, while selections for some of the many purposes to which Roses may be applied are given in the article on *Roses for All Purposes*

ROSE ACACIA.—The genus Robinia and *R. hispida*. See *Trees*.

ROSE APHIDES, or GREEN AND RED FLY.—See *Insect Pests*.

ROSE BANKS.—See *Banks*.

ROSE BAY (*Epilobium augustifolium*). — See *Epilobium* and *Water Garden: Plants for the*.

ROSE-BUD CHERRY (*Prunus pendula*).—See *Trees*.

ROSE CAMPION (*Lychnis Flos-Jovis*). See *Lychnis*.

ROSE CANKER.—See *Rose Diseases*.

ROSE CLASSES.

Though the Hybrid Teas, Teas, Hybrid Perpetuals, and Pernetianas or Austrian Hybrids, with the Wichuraianas and multifloras, comprise the bulk of the Roses in general cultivation, there are several important classes which also provide varieties of great merit, and which find a place in many gardens. Botanists recognise a large number of species which are rarely met with outside botanical collections; but the following sections do not come within this category:—

Austrian Briar Roses: *Austrian Copper.*—Coppery-red flowers.

Austrian Yellow.—Bright yellow flowers.

Harrisonii.—Goldenyellowflowers.

Persian Yellow.—Deep yellow flowers.

Ayrshire Roses: *Bennett's Seedling* (Syn. *Thoresbyana*).—Pure white flowers in clusters. Climber.

Dundee Rambler.—White, semi-double flowers, with pink edges. Climber.

Rampant.—Pure white flowers in clusters. Climber.

Splendens (Syn. *Myrrh-scented*).—White flowers, tinted flesh colour, and semi-double. Climber.

Banksian Roses: *Alba.*—Small, white flowers in clusters, sweetly scented. Climber.

Lutea.—Small, yellow flowers in clusters. Climber.

Bourbon Roses: *Acidalie.*—White flowers, sometimes tinted pink.

J. B. M. Camm.—Pale, salmon-pink flowers.

Madame Isaac Pereire.—Bright carmine flowers.

Mrs Allen Chandler.—Pure white flowers. A sport from *Mrs Paul.*

Mrs Paul.—Blush white flowers, shaded with rosy peach.

Souvenir de la Malmaison.—Blush white flowers, deeper in centre.

Souvenir de la Malmaison, Climbing.—A climbing form of the preceding.

Boursault Roses : *Amadis* (Syn. *Crimson*).—Purplish-crimson flowers; good for pillars.

Gracilis.—Bright pink flowers; pillar.

Inermis.—Bright red flowers. Climber.

Cabbage Roses.—See PROVENCE ROSES.

China Roses : *Antoinette Cuillerat.*—Rosy copper flowers, edged rose.

Arethusa.—Clear yellow flowers, shaded apricot.

Charlotte Klemm.—Fiery red, semi-double flowers.

Chin Chin. — Sulphur - yellow flowers.

Common China (or *Old Monthly Rose*).—Blush pink flowers.

Comtesse du Cayla.—Crimson-red and coppery-yellow flowers, with carmine shading.

Cramoisi Supérieur. — Velvety crimson flowers.

Ducher.—Pure white flowers.

Duke of York.—Pink and white flowers.

Fabvier.—Scarlet-crimson flowers, with white centre.

Irene Watts.—Rose flowers, shading to very pale pink.

Laurette Messimy.—Rose flowers, shaded yellow.

Madame Eugène Resal.—Coppery-red to pink flowers.

Mrs Bosanquet. — Pale, flesh-coloured flowers.

Old Crimson. — Deep crimson flowers.

Queen Mab.—Rosy apricot flowers, shaded orange.

Viridiflora. — Green - petalled flowers.

Climbing Roses.—See article on *ROSES FOR ALL PURPOSES.*

Damask Roses : *Commandant Beaurepaire.*—Bright red flowers, striped purplish-violet and white.

Crimson Damask.—Brightcrimson, singleflowers.

Lady Curzon. — Pink, single flowers.

Lady Sarah Wilson. — Creamy blush, semi-double flowers.

Madame Zoetmans. — Cream-flowers, tinted flesh colour.

Mrs O. G. Orpen.—Blush pink, single flowers.

York and Lancaster.—White and red flowers.

Evergreen Roses.—See article on *ROSES FOR ALL PURPOSES.*

French Roses (*Rosa gallica*): *Dometil Becard.* — White flowers, striped rose.

Oillet Flamand.—Rose flowers, striped white and red.

Perle des Panaches (Syn. *Village Maid*).—Red and lilac flowers, striped white.

Rosa Mundi.—Red flowers, striped white.

Hybrid Bourbon Roses : *Charles Lawson.*—Clear pink flowers.

Coupe d'Hebe.—Bright pink flowers.

Kathleen Harrop.—Shell pink semi-double flowers.

Purity.—White flowers, with flushed centre.

Zèphirine Drouhin.—Silvery-pink, semi-double flowers ; thornless.

Hybrid China Roses : *Armosa* (Syn. *Hermosa*).—Pale pink flowers.

Blairii No. 2.—Blush flowers, with rose centre.

Field-Marshal. — Deep crimson flowers.

Fulgens.—Rich crimson flowers.

Hermosa.—See *Armosa.*

Madame Plantier.—Pure white flowers.

Vivid.—Bright scarlet flowers.

Hybrid Perpetual Roses.—This is a very large class, the best of which are mentioned in the article on *Roses for All Purposes.*

Hybrid Sweet Briar Roses.—Also called Penzance Briars.

Amy Robsart.—Deep rose flowers.

Anne of Geierstein.—Dark crimson flowers.

Brenda.—Delicate peach flowers.

Catherine Seyton. — Rosy-pink flowers.

Edith Bellenden.—Pale rose flowers.

Flora McIvor.—White flowers, with rosy flush.

Green Mantle. — Bright pink flowers, with white base to petals.

Hebe's Lip.—White flowers, with picotee edge of carmine.

Janet's Pride.—White flowers, tipped and shaded crimson.

Jeannie Deans.—Scarlet-crimson, semi-double flowers.

Julia Mannering. — Soft pink flowers.

Lady Penzance. — Soft copper flowers, bright yellow base to petals.

Lord Penzance.—Fawn flowers, shading to yellow in centre.

Lucy Ashton.—White flowers, with pink edges.

Lucy Bertram. — Deep crimson flowers, with white centre.

Meg Merrilees.—Rich crimson flowers.

Minna.—Pure white flowers.

Refulgence. — Brilliant scarlet flowers.

Rose Bradwardine.—Rose flowers.

Hybrid Tea Roses. — This class numbers several hundred varieties, and the list is constantly being added to; some of the most useful are referred to in the article on *Roses for All Purposes.*

Hybrid Wichuraiana Roses.—This class has rapidly forced its way into popular favour since the introduction of the lovely *Dorothy Perkins,* and now the list is a lengthy one. The following are some of the most noteworthy:—

Albéric Barbier. — Deep cream flowers, becoming white as they develop.

Aviateur Bleriot.—Golden-yellow flowers.

Coquina.—Pale pink, single flowers, with yellow base.

Dorothy Perkins. — Pale pink flowers.

Emily Gray. — Golden-yellow flowers, deeper in bud.

Excelsa.—Crimson flowers.

François Juranville.—Bright, rosy-fawn flowers.

Gardenia.—Yellow flowers, becoming almost white as they open.

Hiawatha.—Crimson, single flowers, with white centre.

Jersey Beauty.—Pale yellow, single flowers, opening almost white.

Lady Gay.—Rose-pink flowers.

Lady Godiva. — Salmon-pink flowers.

Léontine Gervais.—Pinkish-fawn flowers, coming near yellow as flower expands.

Minnehaha.—Deep rose flowers.

Paul Transon.—Rose-pink flowers.

Shower of Gold.—Yellow flowers, paling with age.

White Dorothy.—White sport from *Dorothy Perkins.*

Moss Roses: *Baron de Wassenaer.*—Light crimson flowers.

Blanche Moreau. — Pure white flowers.

Céline.—Bright crimson flowers.

Common or *Old Moss.*—Pink flowers.

Crested Moss.—Rose-pink flowers.

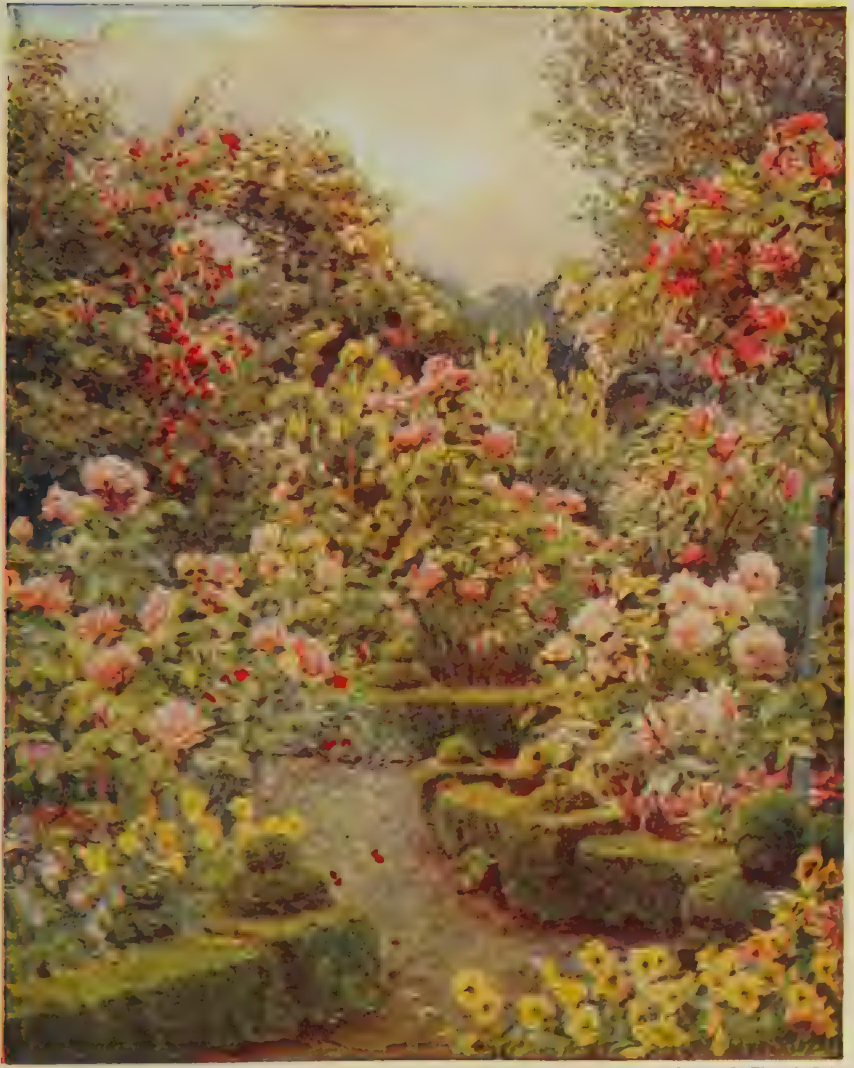
Eugène Verdier. — Vermilion-red flowers.

Henry Martin.—Deep red flowers.

Little Gem.—Crimson flowers.

Marie de Blois.—Bright rose flowers.

Salet.—Clear rose flowers.



George S. Elgood, R.I.

A PATH IN A ROSE GARDEN

White Bath.—White flowers.

Zenobia.—Satin-pink flowers.

Musk Roses: *Moschata alba.*—White flowers, tinted pink.

Moschata nivea.—White flowers, with black stamens.

Queen of the Musks.—Rose-pink buds; white, flushed pink when open.

Rivers' Musk.—Pink flowers, with buff shade.

Snowstorm.—Pure white, perpetual flowers.

Noisette Roses: *Aimée Vibert.*—Pure white flowers.

Alister Stella Gray.—Pale yellow flowers, with deeper centre.

Beauty of Glazenwood. — Syn. *Fortune's Yellow*, which see.

Céline Forestier.—Pale yellow flowers.

Climbing Aimée Vibert. — Pure white flowers.

Cloth of Gold.—Yellow flowers.

Fellemberg.—Rosy-crimsonflowers.

Fortune's Yellow.—Yellow and carmine flowers.

Golden Queen. — Golden-yellow flowers.

Lamarque.—Pale lemon flowers.

L'Idéal.—Bronzy-red and yellow flowers.

Madame Alfred Carrière.—White flowers, with yellow base.

Maréchal Niel. — Rich yellow flowers.

Rêve d'Or.—Orange-yellow flowers.

William Allen Richardson.—Deep orange-yellow flowers, paler at edge.

Penzance Briar Roses. — See HYBRID SWEET BRIAR ROSES.

Pernetiana Roses (also called AUSTRIAN HYBRID ROSES and HYBRID BRIARS): *A. R. Goodwin.*—Coppery, orange-yellow flowers.

Beauté de Lyon.—Coral-red flowers, suffused yellow.

Cissie Easlea. — Saffron - yellow flowers, with carmine centre.

Constance.—Orange-yellowflowers.

Juliet.—Rosy-red flowers, outside of petals old gold.

Louise C. Breslau.—Pink flowers, varying to pale orange and coppery-red.

Madame E. Herriot. — Nasturtium-red flowers, changing to pink.

Rayon d'Or.—Deep yellow flowers.

Severine.—Coral-red flowers, paler when fully open.

Soleil d'Or.—Orange-yellowflowers.

Viscountess Enfield.—Coppery, old rose flowers, shaded with yellow.

Willowmere. — Shrimp - pink flowers, shaded with yellow.

Polyantha Roses[1]: *Ænnchen Muller.*—Bright rose-pink flowers.

Aschenbrödel.—Pale peach flowers, with deeper centre.

Baby Dorothy.—Dwarf form of *Dorothy Perkins.*

Baby Tausendschön.—Soft pink flowers.

Canarienvogel. — Golden-yellow and orange flowers.

Cecile Brunner.—Blush flowers, shaded pale pink.

Ellen Poulsen.—Dark pink flowers.

Erna Teschendorf.—Bright crimson flowers.

Eugènie Lamesch.—Orange-yellow flowers, shaded with carmine.

Gloire des Polyanthas.—Deep rose flowers, with white base.

Jessie.—Rosy-crimson flowers.

Katherine Zeimet.—Pure white flowers.

Léonie Lamesch. — Coppery - red flowers, with golden centre.

Madame N. Levavasseur.—Rosy-pink flowers.

Mrs W. H. Cutbush.—Deep pink flowers.

Orleans Rose. — Rosy - crimson flowers, with paler centre.

Perle d'Or. — Nankeen - yellow flowers.

Rosalind.—Bright pink flowers.

White Pet.—White flowers.

---

[1] The POMPON ROSES of some authorities.—EDITOR.

Yvonne Rabier.—White flowers, pale yellow at base.

Provence Roses : *Cabbage* or *Common.*—Rosy-pink flowers.

Cristata or *Crested.*—Rose flowers, with pale edge.

De Meaux or *Pompon.*—Rosy-pink flowers.

Maiden's Blush (Syn. *Celestial*).—Flesh-tinted pink flowers.

White or *Unique.*—Pure white flowers.

Rambler Roses (or *Rosa multiflora scandens,* and also called CLIMBING POLYANTHA ROSES) :

Aglaia.—Bright yellow flowers.

American Pillar.—Pink flowers, with white centre.

Blush Rambler.—Pale rose flowers, with lighter centre.

Buttercup.—Deep yellow flowers, paling when open.

Claire Jacquier.—Nankeen-yellow flowers.

Crimson Rambler.—Bright crimson flowers.

Electra.—Lemon-yellow flowers.

Euphrosyne.—Light pink flowers.

Goldfinch.—Orange-yellow flowers.

Gruss an Zabern.—White flowers.

Hélène.—Pale pink flowers, tinted mauve.

Leuchstern.—Rose flowers, with white edge.

Mrs F. W. Flight.—Pink flowers, with white centre.

Philadelphia Rambler.—Rich crimson flowers.

Psyche.—Pale rosy-pink flowers.

Queen Alexandra. — Rich rose flowers.

Rubin.—Deep crimson flowers.

Tausendschön (Syn. *Thousand Beauties*).—Bright pink and carmine flowers.

Thalia.—Pure white flowers.

Trier.—Creamy white flowers.

Veilchenblau (the so-called BLUE ROSE).—Pinkish-mauve flowers.

Waltham Bride. — Pure white flowers.

Waltham Rambler. — Rosy - pink flowers.

White Tausendschön.—White sport from *Tausendschön.*

Rugosa Roses : *Alba.*—Pure white, single flowers.

Altropurpurea. — Deep crimson flowers.

Blanc double de Coubert.—Pure white flowers.

Conrad F. Meyer.—Silvery-rose flowers.

Delicata.—Soft rose flowers.

Fimbriata.—White flowers, tinted blush.

Madame Georges Bruant.—Pure white flowers.

Mrs Anthony Waterer.—Deep red flowers.

Nova Zembla.—White sport from *Conrad F. Meyer.*

Repens alba.—White flowers.

Rose à Perfum de l'Hay.—Brilliant red flowers.

Rubra.—Deep rose flowers, shaded violet.

Sweet Briar Roses : *Common.*—Pale pink flowers.

Double Scarlet.—Bright red flowers.

Double White.—White flowers, tinted flesh.

Tea Roses.—See article on *ROSES FOR ALL PURPOSES.*

Wichuraiana Roses.—See HYBRID WICHURAIANA ROSES.—W. J. C.

UP-TO-DATE SELECTIONS.

Admiration (*H.T.*).—Cream and vermilion.

Albertine (*H.T.*).—Pale copper and salmon-pink.

Alice Amos (*Hy. Poly.*).—Cerise-rose and white.

Allen Chandler (*H.T.*).—Scarlet.

Angèle Pernet (*Pernet*).—Apricot.

Angeles Mateu (*H.T.*).—Salmon and gold.

Atalanta (*Cl.*).—Salmon-pink, becoming blush pink.

Augustus Hartman (*H.T.*).—Red and orange.

Aureate (*H.T.*). — Cream and orange.

Autumn (*H.T.*).—Apricot and rose.

B. W. Price (*H.T.*).—Orange-scarlet.

Baby Betty (*Poly. Pom.*).—Pink.

Barbara Richards (*H.T.*).—Creamy white flushed buff yellow.

Baroness H. von Geyr (*H.T.*).—Pink and red.

Betty Prior (*H. Poly.*).—Carmine and scented.

Betty Sutor (*H.T.*).—Pink.

Betty Uprichard (*H.T.*).—Orange-pink.

Bloomfield Quakeress (*Wich. Musk*).—Pink and scented.

Buttermere (*H. Wich.*).—Cream, shading to pink.

C. V. Haworth (*H.T.*).—Crimson-maroon.

Caledonia (*H.T.*).—Double white.

Captain Kilbee-Stuart (*H.T.*).—Crimson.

Chameleon (*H.T.*).—Red, yellow, and rose-pink.

Chaplin's Pink Climber (*H. Wich.*).—Pink.

Charles P. Kilham (*H.T.*).—Scarlet and orange.

Charmer(*H.T.*).—Pinkandscented.

Chatillon Rose (*Hy. Poly.*).—Pink and white.

Cheerful (*H.T.*).—Orange and orange-yellow.

Cherry (*H.T.*).—Carmine and yellow.

Christine (*H.T.*).—Yellow and red.

Clarice Goodacre (*H.T.*).—Yellow on white.

Climbing Etoile de Gollande (*H.T.*).—Crimson and strongly scented.

Climbing Madam Butterfly (*H.T.*).—Pink and apricot.

Climbing Madame Eduard Heriot (*Pernet*).—Terra-cotta,becomingrose.

Clytemnestra (*H.T.*).—Salmon.

Col. Oswald Fitzgerald (*H.T.*).—Crimson.

Comtesse Vandal (*H.T.*).—Pink and gold.

Constance (*P.*).—Golden-yellow.

Coral Cluster (*Dwarf Poly.*).—Pink.

Covent Garden (*H.T.*).—Scarlet.

Crimson Conquest (*Climbing H.T.*).—Crimson and scented.

Cupid (*H.T.*).—Flesh-pink.

Dainty Bess (*H.T.*).—Pink, single.

Dame Edith Helen (*H.T.*).—Pink.

Davidi (*species*).—Pink.

Dazla (*H.T.*).—Gold and orange.

Delightful (*H.T.*).—Rose and gold.

Doctor H. Hawkesworth (*H.T.*).—Crimson.

Dorinna Neave (*H.T.*).—Pink.

Duchess of Atholl (*H.T.*).—Orange and rose.

Duchess of Montrose (*H.T.*).

E. J. Ludding (*H.T.*).—Pink and salmon.

Earl Haig (*H.T.*).—Crimson-red.

Edith Cavell (*H.T.*).—Pale yellow-white.

Elizabeth Cullen (*H.T.*).—Crimson-scarlet.

Elsie Poulsen (*Hy. Poly.*).—Rose-pink.

Essence (*H.T.*).—Crimson and fragrant.

Everest (*H.T.*).—Creamy-white.

Evert Van Dyk (*H.T.*).—Pink and fragrant.

Flame of Fire (*H.T.*).—Orange.

Flamingo (*H.T.*).—Cerise.

Florence Spaull (*H.T.*—Rose-pink.

Francis Gaunt (*H.T.*).—Buffcream.

Gaiety (*H.T.*).—Red and orange.

George Daken (*H.T.*).—Salmon flushed pink.

Gladys Holland (*H.T.*).—Cream, back salmon.

Gloria Mundi (*Poly.*).—Scarlet.

Golden Dawn (*T.*).—Yellow.

Golden Emblem (*H.T.*).—Yellow, striped crimson.

Golden Glory (*H.T.*).—Golden.

Golden Ophelia (*H.T.*).—Yellow.

Golden Salmon (*Dwarf Poly.*).—Salmon-yellow.

H. Chaubert (*Hybrid*).—Salmon-copper.

Hilda (*H.T.*).—Pink and carmine.

Hilde Apelt (*H.T.*).—Yellow.

Hilde Steinert (*H.T.*).—Coral and gold.

Hoosier Beauty (*H.T.*).—Crimson-scarlet.

Independence Day (*H.T.*).—Orange-apricot and pink.

Irene Thompson (*H.T.*).—Orange, becoming paler.

Isobel (*H.T.*).—Carmine, orange-scarlet, bronze, and yellow.

J. C. Thornton (*H.T.*).—Crimson.

J. G. Glassford (*H.T.*).—Crimson-scarlet.

Janet (*H.T.*).—Buff yellow and salmon.

Joyous Cavalier (*H.T.*).—Scarlet.

Jubilee (*H.T.*).—Cream.

Julien Potin (*H.T.*).—Yellow.

K. of K. (*H.T.*).—Scarlet-crimson.

Karen Poulsen (*H. Poly.*).—Scarlet and scented.

Kate Schmidt (*Climbing H.T.*).—Pink and scented.

Kersbergen (*Poly.*).—Crimson-scarlet.

Kirsten Poulsen (*Hy. Poly.*).—Red.

Korovo (*H.T.*).—Pink, salmon, and gold.

Lady Barnby (*H.P.*).—Pink or rose-pink.

Lady Bowater (*H.T.*).—Cream, blush, and apricot.

Lady Forteviot (*Pernet*).—Apricot.

Lady Inchiquen (*H.T.*).—Pink and orange.

Lady Mandeville (*H.T.*).—Pink, gold, and cerise.

Lady Sackville (*H.T.*).—Pink and moderately fragrant.

Lady Violet Astor (*H.T.*).—Pink.

Lamia (*H.T.*).—Orange-red.

Lemon Pillar (*H.M.*).—Sulphur-yellow, becoming lemon-white.

Li Burés (*Pom.*).—Yellow and red.

Lilian (*H.T.*).—Yellow.

Lilian Moore (*H.T.*).—Cream and orange.

Loveliness (*H. Wich.*).

Lucie Marie (*H.T.*).—Apricot.

Luis Brinas (*H.T.*).—Orange and scented.

Mabel Morse (*H.T.*).—Yellow.

Mabel Turner (*H.T.*).—Pink or salmon.

Madame Colet Martinet (*H.T.*).—Yellow, shaded orange.

Madame Gabriel Hanra (*H.T.*).—Red and scented.

Madame Georges Petit (*H.T.*).—Scarlet and scented.

Madame Trimeau (*H.T.*).—Pink-gold.

Madge Wildfire (*H.T.*).—Cerise and scented.

Majestic (*H.T.*).—Rose-carmine.

Marchioness of Linlithgow (*H.T.*).—Crimson.

Maréchal Pétain (*H.T.*).—Yellow and pink.

Margaret Dickson Hamill (*H.T.*).—Straw-yellow and carmine.

Margaret McGredy (*H.T.*).—Orange-scarlet.

Martha Drew (*H.T.*).—Salmon-pink, becoming blush, and cream.

Mary Hicks (*H. Mult.*).—Pink or rose-pink.

May Wettem (*H.T.*). — Rose-pink.

McGredy's Ivory (*H.T.*).—Cream and yellow.

Memory(*H.T.*).—Pink and scented.

Mermaid (*Hybrid*).—Yellow.

Miriam (*H.T.*).—Apricot-pink.

Miss May Marriott (*P.*).—Apricot.

Miss Rovena Thorn (*H.T.*).—Gold and rose.

Miss Stewart Clarke (*H.T.*).—Yellow.

Mrs A. R. Barraclough (*H.T.*).—Carmine or pink-carmine.

Mrs Beatty (*H.T.*).—Yellow.

Mrs Bryce Allen (*H.T.*).—Rose carmine.

Mrs C. V. Haworth (*H.T.*).—Rosy-pink, apricot, and salmon.

Mrs E. Pembroke Thorn (*H.T.*).—Yellow.

Mrs Elisha Hicks (*H.T.*).—Blush-rose.

Mrs G. A. Van Rossem (*H.T.*).—Apricot on yellow.

Mrs G. Geary (*H.T.*).—Red and pink.

Mrs George Marriott (*H.T.*).—Cream and rosy-vermilion.

Mrs George Norwood (*H.T.*).—Pink.

Mrs Henry Bowles (*H.T.*).—Rose.

Mrs Henry Morse (*H.T.*).—Rose-pink.

Mrs Hugh Dickson (*H.T.*).—Cream, apricot, and orange.

Mrs S. Paton (*H.T.*).—Carmine-orange.

Mrs Sam McGredy (*H.T.*).—Orange and red.

Mrs Wemyss Quin (*H.T.*).—Yellow.

Modesty (*H.T.*).—Cream and rose.

Molly Bligh (*H.T.*).—Pink and yellow.

National Emblem (*H.T.*).—Crimson.

Orange King (*Dwarf Poly.*).—Orange.

Oswald Sieper (*H.T.*).—White and gold.

Oxford (*H.T.*).—Yellow and pink.

Paul Crampel (*Dwarf Poly.*).—Orange-scarlet.

Paul's Scarlet Climber (*W.*).—Crimson-scarlet.

Pax (*H.M.*).—White.

Picture (*H.T.*).—Pink and gold.

Portadown (*H.T.*).—Crimson.

President Hoover (*H.T.*).—Apricot and pink.

President Jac Smits (*H.T.*).—Red.

Prince F. de Luxembourg (*H.T.*).—Deep red and black.

Princess Mary (*H.T.*).—Crimson-scarlet.

Rev. F. Page Roberts (*H.T.*).—Orange-yellow to pure yellow.

Rex Anderson (*H.T.*).—White and gold.

Rosella (*H.T.*).—Red and yellow.

Salmon Spray (*Hy. Poly.*).—Pink and carmine.

Senorita d'Alvarez (*H.T.*).—Pink-copper.

Shot Silk (*H.T.*).—Rose-orange and yellow.

Simone Guerin (*H. Pern.*).—Buff gold.

Sir Henry Seagrave (*H.T.*).—Lemon-yellow and fragrant.

Sunstar (*H.T.*). — Apricot and salmon-red.

Swansdown (*H.T.*).—White.

The Fairy (*Wich. Poly.*).—Dwarf pink.

ROSE DE MEAUX (*Rosa parviflora*). See *ROSE SPECIES.*

ROSE DES ALPES (*Rhododendron ferrugineum* and *R. hirsutum*). See *RHODODENDRON.*

ROSE DISEASES.

[The following notes on Rose Diseases will be of interest and value to those who cultivate the Queen of Flowers.—EDITOR.]

Black Spot (*Actinonema rosae*).—This causes large black spots on the leaves, disfigures the rose bush, and may bring about severe defoliation. The fungus winters either in infected twigs, or infected evergreen leaves of certain roses, in either case producing myriads of spores in the spring ready to infect the young foliage.

REMEDIES.—In winter remove all affected leaves and twigs. In summer spray repeatedly with lime sulphur, 1 part to 50 parts of water, or dust with " flowers " of sulphur, or preferably, 90 parts finely ground sulphur and 10 parts arsenate of lead.

Rose Canker.—The term " canker " in roses covers various types of injury. In some cases it is of the nature of a " gall " and primarily due to the production of adventitious roots, and in others apparently caused by a fungus attack. The well-known canker in Maréchal Niel is of a different nature, and apparently not due to a micro-organism but to constitutional weakness. All these kinds of rose canker are in need of expert investigation. No satisfactory remedies are known.

Rose Green Centre.—An abnormal condition due to a transformation of the central carpels of the flower into small leaf-like structures. The cause is unknown.

Rose Mildew (*Sphaerotheca pannosa*).—This is only too familiar. The leaves are twisted and deformed, and the young shoots stunted and checked by the fungus. Roses vary greatly in their susceptibility to attack. The *multiflora* section are usually badly injured, while the *Wichuraiana* series are almost immune. Hybrid teas vary.

Remedies. — Spray repeatedly with lime sulphur or some other good fungicide, or dust with a fine sulphur powder. In winter prune away and burn infected twigs. Resistant varieties should be chosen where mildew is troublesome.

Rose Rust (*Phragmidium subcorticatum*.—This disease weakens the young wood and may cause severe defoliation. It is common on H.P. roses and wild roses. Teas are almost immune. H.T. roses vary. The orange patches on the twigs in spring are bright and conspicuous ; in the summer a second form of spore causes yellow spots on the leaves, followed by the black spots of the resting spores on the under side of the leaf. The fungus hibernates by means of resting spores and perennial mycelium in the twigs.

Remedy. — Cut away affected twigs in autumn to remove resting mycelium, and gather up diseased leaves ; spraying may be employed in spring and summer as a preventive.—A. D. C.

ROSE, FRENCH.— See *Medicinal Herbs*.

ROSE GRUBS.—See *Insect Pests*.

ROSE MAGGOTS.—See under Rose Grubs in *Insect Pests*.

ROSE MILDEW.—See *Rose Diseases*.

ROSE OF JERICHO.—See *Resurrection Plant*.

ROSE OF SHARON (*Hypericum calycinum*).—See *Shrubs*.

ROSE PLANTING.

This important operation can be divided into three headings : (1) Preparation of the soil ; (2) Planting the trees ; and (3) Treatment after planting.

(1) As regards the preparation of the soil, this should be done as early as possible, for planting is itself usually carried out in October and November. Gardeners who do not give time to the preparation of the soil cannot expect great things of the rose trees. There are two ways, of course, of preparing the soil : (*a*) to dig out a large hole for each tree and fill up with rubbish and fresh soil half-way, and the other half with good soil and manure ; and (*b*) to dig deeply the whole of the border. The first needs no special comment or description, but there is no doubt that the second is the better. It is no waste of time to trench the beds intended for roses, and the trenching should be got through in early October, or as soon as possible, as some time must elapse for the soil to settle before planting can be safely done. Grit and sand can be mixed in if the soil is very heavy, also garden rubbish may be put into the bottom spit. But if the soil cannot be trenched, let it be well double-dug and plenty of good rotted manure mixed in with the bottom spit and the adjacent half of the top spit. Do not put the manure in layers, as so many gardeners do ; try mixing it with the soil. Do not put the manure in the last 9 ins. of soil. When desired, 4 oz. of basic slag and an ounce or so of kainit both ground fine may be scattered over about a square yard of the bed and lightly

pricked in. This should be added as soon as possible to the soil, for it takes some time to dissolve, as all know.

(2) Of course all readers know not to attempt to plant the trees in frosty weather. The trees can be laid-in in some warm spot, and unless they are very tender should come to no harm if the roots are well covered with soil and an old mat thrown over them. In an open spell,—even a day or two,—which we may get in November, go out and get the work through. If you are planting standards, climbers, or pole-ramblers, have ready stakes, poles, or supports of sufficient strength. Fetch out a hole bigger than the area of the rose's roots when arranged fanwise from the collar, and see that it is of depth approximate to that which the rose was originally planted. But you need not in all cases adhere to this, for some nurserymen plant deeper than necessary, for certain vague purposes of their own. Let the bottom of the hole slope downwards a little all round to the edges, rather than the other way. Spread out the roots evenly and carefully as far as you can, and get some one to hold the tree while you drive in the stake or fix in the pole if it needs one. Gardeners should be careful about damaging the roots of roses, and, if any are accidentally broken, the damaged pieces should be cut off clean with a sharp knife. Roses should be planted firmly, and tied at once to their stakes or poles, if any. Cover the roots and fill up the hole with the soil dug out, being careful that no manure comes into direct contact with the root fibres. Firm the trees well as the filling of the hole is in progress, after which make the ground level and tidy.

(3) Do not mulch newly planted roses, but wait till the spring to do this. The after-treatment of newly planted roses is not great, but still should not be neglected. Gardeners should bear in mind that roses are loosened by frost, or harm may be done. After a thaw go round and firm the trees at once. Do this, of course, with your foot. This treatment will have to be repeated periodically all the winter.

As regards protection many do not need it in average winters. But if roses which are a little tender be grown as climbers on walls or over arches, they can be protected by pieces of matting tacked or tied over the growths, and some gardeners cover the roots with straw, or again by putting pieces of old matting over them. It would, of course, be inconvenient to keep on removing and replacing such protections, so if it be really necessary to use them they should be put on soon after planting and not removed till March. It must be remembered that climbers and others should have their growths secured, or in windy weather these may be damaged. The wind, while tossing these about, often pulls at the roots of the rose trees, so it is necessary to plant all kinds firmly, and tie up any that need it securely.

E. T. E.

ROSE ROOT (*Sedum roseum*).—See *SEDUM*.

ROSE RUST.—See *ROSE DISEASES*.

ROSE SAWFLIES and ROSE SLUG-WORM.—See *INSECT PESTS*.

ROSE SPECIES.

A few notes on some of the best species are given below:—

Rosa alba.—This and its variety *suaveolens* bear white flowers from June onwards, and grow about 4 ft. in height.

R. alpina.—This bears blush-pink flowers from June to August, and averages 3–6 ft. in height. The hybrid between it and *R. indica* is known as the BOURSAULT ROSE.

R. arvensis (AYRSHIRE ROSE).—This bears white flowers from June to August, while pink or flesh-coloured varieties of it are also available. The height averages 3–20 ft.

R. Banksiae (BANKSIAN ROSE).—This bears pure white and light buff-yellow flowers from June onwards, and may attain a height of 20 ft.

R. beggeriana.—This bears white flowers from June to August, and grows about 5 ft. high. Its varieties *nigrescens* and *Schrenki* might also be grown.

R. blanda.—This bears pretty red flowers from May to July on plants 3–6 ft. in height. Its varieties *arkansana*, *Sayi*, *setigera*, and *willmottiana* should also be grown.

R. bourbonia (BOURBON ROSE).—This bears purple flowers from June to August, and grows 8–10 ft. high.

R. bracteata (MACARTNEY ROSE).—This bears white flowers from July onwards, and averages about 2 ft. high.

R. canina (DOG ROSE).—About fifteen varieties of this figure in the *Kew Hand-list of Trees and Shrubs*. It is one of the stocks on which many roses are grafted, but in itself is quite unworthy of cultivation, save in the wild garden. It bears, according to the variety, glowing crimson-pink or purple flowers in June, and averages 6–8 ft. in height.

R. cinnamomea. — This bears charming pink flowers from May to June, and grows 5–6 ft. in height. Its varieties *flore pleno* (double), *glandulifolia*, and *sibirica* might also be grown.

R. damascena (DAMASK ROSE).—This bears lovely pink flowers from June onwards, and grows about 1 yd. in height. Its variety *variegata*, the flowers of which are striped, is known as the YORK AND LANCASTER ROSE.

R. ferruginea.—This bears small, rose flowers, but is prized for its plum coloured foliage and "rust-coloured" branches and twigs. It has numerous scarlet hips, and grows from 5–10 ft. high.

R. gallica.—This, known by some as the FRENCH ROSE, bears pink flowers in June, and grows ¾–2½ ft. in height. It has very numerous varieties. Of these, *muscosa* is the MOSS ROSE, while *provincialis* is the PROVENCE ROSE.

R. indica (MONTHLY ROSE).—This is available in many varieties most of which bloom from June to the end of the summer. The type is, however, seldom without flowers. There is a good colour range, containing blush-pink, red, rose, white, and yellow. The variety *minima* is known as the FAIRY ROSE, and *sanguinea* is the CRIMSON CHINA ROSE. The height averages 1–20 ft.

R. laevigata (CHEROKEE ROSE).—This bears white flowers from June onwards, and averages 4–6 ft. in height.

R. lutea (AUSTRIAN BRIAR).—This bears yellow flowers from June onwards, and averages 3–4 ft. in height.

R. moschata (MUSK ROSE).—This bears white flowers from August onwards, and averages 12–20 ft. in height. Its varieties *flore pleno* and *Pissarti* are also worthy of inclusion.

R. Moyesii.—This bears bright red flowers from June to August, and grows 6–10 ft. high.

R. multiflora. — This bears red flowers from June onwards, and averages 10–15 ft. high. Its varieties *flore pleno* and *Thunbergii*, also its hybrids with *R. indica* and *R. moschata*, are worthy of inclusion.

R. nitida.—This bears bright red flowers in July and August on plants about 1 yd. high. The foliage is prettily tinted in the autumn.

R. noisettiana (Noisette Rose).—This bears red flowers from July onwards on plants attaining a height of 3 ft.

R. nutkana (Wasatch Rose).—This bears flowers of all shades of red from June onwards, and grows 3–6 ft. high.

R. parviflora (Rose de Meaux).—This bears flowers of the palest rose from July onwards, and averages 1½–2 ft. in height.

R. pomifera (Apple Rose).—This bears red flowers from June to October, and averages 4½ ft. in height.

R. rubiginosa (Eglantine or Sweet Briar).—This is an old favourite bearing pink flowers from June to July on plants about 5 ft. high.

R. rugosa (Japanese Rose).—This and its numerous varieties bear red and white flowers from June to September, and grow –6 ft. high.

R. sempervirens.—This bears pure white flowers from June onwards, and grows up to about 20 ft. high.

R. sericea.—This bears white flowers from May to July, on plants 5–10 ft. in height.

R. setigera (Prairie Rose).—This bears rose-coloured flowers from June onwards, on plants 10–25 ft. high.

R. spinosissima (Burnet Rose or Scotch Rose).—This and its numerous varieties bear yellow, white, and red flowers from May onwards, the height of the plants averaging 2–4 ft.

R. wichuraiana (Wichuraiana Rose).—This bears pure white flowers from June onwards, and has a prostrate habit of growth. Its variety *rubra* is bright red. It is much used as a climber, and has given rise to numerous garden varieties.

R. xanthina.—This bears yellow flowers throughout the summer, and grows 3–6 ft. high.

For garden varieties of the majority of these species reference should be made to our article on *Rose Classes*, in which the various groups are given under their best known names.

ROSE VERVAIN (*Verbena Aubletia*).—See *Verbena Species.*

ROSEMARY.—The genus Rosmarinus and *R. officinalis.* See *Potherbs* and *Shrubs.*

ROSES: Diseases of.—See *Rose Diseases.*

ROSES FOR ALL PURPOSES.

It is safe to say that no plant is capable of more varied application for the purposes of the gardener than is the Rose. It is merely necessary to glance at the following paragraphs to realise this, and to understand how rightly the Rose is called The Queen of Flowers. The following abbreviations are used to denote the different classes: *C.* China; *H.B.* Hybrid Bourbon; *H.P.* Hybrid Perpetual; *H.T.* Hybrid Tea; *N.* Noisette; *P.* Pernetianas or Austrian Hybrids; *T.* Tea; and *W.* Wichuraianas.

Roses for Arbours, Arches, and Pergolas.—For this purpose the Wichuraiana Roses are greatly favoured, as they give, when in bloom, a glorious mass of colour (for colours see Hybrid Wichuraianas in the article *Rose Classes*); but they have the drawback of flowering once only during the season. They do not bloom all at the same time, however, and by planting early, mid-season, and late varieties, a much longer period of blooming can be assured—from June to late August, or even into September. The following list gives a guide to the approximate period of flowering, the mid-season sorts coming on as the earlier ones are getting past their best, and the late varieties overlapping those:—

Early-Flowering.—*Albéric Barbier, Auguste Barbier, Aviateur Bleriot, Climbing American Beauty, Eliza Robichon, François Guillot,* *Gardenia, Gerbe Rose, Jersey Beauty, Joseph Billard, Paul Transon, René André, Robert Craig, Ruby Queen, Shower of Gold.*

MID-SEASON. — *Anna Rubsamen, Débutante, Edmond Proust, François Juranville, Jean Guichard, Joseph Liger, Léontine Gervais, Manda's Triumph, Milky Way, Rubra, Schneeball, Valentine Beaulieu.*

LATE-FLOWERING.—*Christian Curle, Dorothy Perkins, Excelsa, Hiawatha, Lady Gay, Lady Godiva, Minnehaha, Mrs Littleton Dewhurst, Paul Ploton, Sweetheart, The Farquhar, White Dorothy, Wichuraiana.*

The RAMBLER ROSES (multiflora or Climbing Polyantha section), as well as the AYRSHIRE ROSES (for both of which see the article on *ROSE CLASSES*), are likewise good for this purpose, but with them, too, there is only a comparatively brief season. There is, however, a good selection of Roses for Arches, etc., that flower more or less freely throughout the season, principally in the Hybrid Tea, Noisette, and Tea Sections. Among the best of these are the following :—

Alister Stella Gray (*N.*).—Pale yellow flowers with orange centre.

Ards Rover (*H.P.*).—Dark crimson flowers.

Bouquet d'Or (*DIJON T.*).—Yellow and buff flowers.

Carmine Pillar (*H.T.*).—Rosy-carmine, single flowers.

Climbing Aimée Vibert (*N.*).—White flowers.

Climbing Caroline Testout (*H.T.*).—Silvery-pink flowers.

Climbing Mrs W. J. Grant (*H.T.*).—Bright rosy-pink flowers.

Climbing Richmond (*H.T.*).—Rich scarlet flowers.

Gloire de Dijon (*T.*).—Buff flowers with orange centre.

Longworth Rambler (*H.T.*).—Light crimson, semi-double flowers.

Madame Alfred Carrière (*N.*).—White flowers.

Reine Marie Antoinette (*H.T.*).—Cherry-red flowers.

Reine Olga de Wurtemberg (*H.T.*).—Rosy-crimson flowers.

Rêve d'Or (*N.*). — Buff-yellow flowers.

William Allen Richardson (*N.*).—Orange-yellow flowers.

Roses for Bedding.—The multiplicity of Roses now in commerce gives almost illimitable scope for the exercise of individual choice, so that the following lists are put forward rather as suggestions, and because the varieties named have been proved suitable for the purpose. They are, in the majority of cases, good for autumn flowering. It should be remembered that Roses vary in average height, and that in bedding it is advisable to put the taller-growing varieties in positions where they will not hide the others. The tall varieties are here put in a separate list. For the front of the bed the dwarf Polyanthas are well adapted, and a list of these will be found in the article on *ROSE CLASSES*.

DWARF TO MEDIUM HEIGHT.—*Alexander Hill Gray.* (*T.*).—Deep lemon and yellow flowers.

Arthur R.Goodwin (*P.*).—Coppery-orange flowers.

Augustine Guinoisseau (*H.T.*).—White, tinted blush flowers.

Betty (*H.T.*). — Coppery-rose flowers, shaded with yellow.

Brilliant (*H.T.*).—Intense scarlet flowers.

British Queen (*H.T.*).—Creamy-white flowers.

Captain Hayward (*H.P.*).—Scarlet-crimson flowers.

Caroline Testout (*H.T.*).—Silvery-pink flowers.

Charles de Lapisse (*H.T.*).—Blush flowers.

Chateau de Clos Veugeot (*H.T.*).—Dark crimson flowers.

Clara Watson (*H.T.*). — Pale flesh flowers, tinted with rosy-peach.

Claudius (*H.T.*).—Bright crimson flowers.

Comtesse du Cayla (*C.*).—Nasturtium-red flowers.

Countess of Derby (*H.T.*).—Rose flowers with salmon centre.

Countess of Shaftesbury (*H.T.*).—Rose-pink flowers.

Dora van Tets (*H.T.*).—Deep crimson flowers.

Dorothy Page Roberts (*H.T.*).—Coppery-pink flowers, suffused with yellow.

Dr J. Campbell Hall (*H.T.*).—Coral-rose flowers.

Duchess of Wellington (*H.T.*).—Saffron-yellow flowers.

Earl of Warwick (*H.T.*).—Salmon-pink flowers.

Ecarlate (*H.T.*).—Scarlet flowers.

Edu Meyer (*H.T.*).—Coppery-yellow flowers, shaded with yellow.

Edward Mawley (*H.T.*).—Deep crimson flowers.

Ethel Malcolm (*H.T.*).—Ivory-white flowers, shaded with peach.

General McArthur (*H.T.*).—Bright crimson flowers.

George C. Waud (*H.T.*).—Orange-vermilion flowers.

Gustav Grünerwald (*H.T.*).—Carmine flowers.

Harry Kirk (*H.T.*). — Sulphur-yellow flowers.

Hon. Ina Bingham (*H.T.*).—Rich pink single flowers.

Hugo Roller (*T.*).—Lemon-yellow flowers with rose edge.

Irish Elegance (*H.T.*).—Bronzy-orange in bud, but opens to apricot flowers. Single.

Irish Fireflame (*H.T.*).—Fiery-orange in bud, but opens to pale crimson flowers. Single.

Jonkheer J. L. Mock (*H.T.*).—Carmine-pink flowers.

Joseph Lowe (*H.T.*). — Blush flowers.

Kaiserin Augusta Victoria (*H.T.*).—Creamy-white flowers.

Killarney (*H.T.*).—Soft pink flowers.

La France (*H.T.*). — Rosy-pink flowers.

Lady Alice Stanley (*H.T.*).—Silvery-pink flowers.

Lady Ashtown (*H.T.*).—Deep pink flowers.

Lady Battersea (*H.T.*).—Cherry-crimson flowers.

Lady Hillingdon (*T.*).—Orange-yellow flowers.

Lady Pirrie (*H.T.*).—Coppery, salmon-pink flowers.

Lady Roberts (*T.*). — Reddish-apricot flowers.

Lady Ursula (*H.T.*).—Flesh-pink flowers.

Laurent Carle (*H.T.*).—Velvety-crimson flowers.

Le Progrès (*H.T.*).—Nankeen-yellow flowers.

Leslie Holland (*H.T.*).—Scarlet-crimson flowers.

Lieut. Chauré (*H.T.*).—Velvety-crimson flowers.

Lohengrin (*H.T.*). — Silvery-pink flowers.

Louise Catherine Breslau (*P.*).—Shrimp-pink flowers, shaded with yellow.

Mabel Drew (*H.T.*).—Cream, passing to yellow flowers.

Madame Abel Chatenay (*H.T.*).—Carmine flowers, shaded with salmon.

Madame Edouard Herriot (*P.*).—Terra-cotta-red flowers.

Madame Eugène Resal (*C.*).—Coppery-rose flowers, shaded with orange.

Madame Jules Grolez (*H.T.*).—Silvery-rose flowers.

Madame Lambard (*T.*).—Salmon-rose flowers.

Madame Leon Pain (*H.T.*).—Silvery-salmon flowers.

Madame Mélanie Soupert (*H.T.*).—Salmon-yellow flowers, suffused with carmine.

Madame Ravary (*H.T.*).—Orange yellow flowers.

Madame Segond-Weber (*H.T.*).—Rosy-salmon flowers.

Marquise de Sinety (*H.T.*).—Golden-yellow flowers, shaded with bronzy-red.

Melody (*H.T.*). — Saffron-yellow flowers, with paler edges.

Milady (*H.T.*).—Rich scarlet flowers.

Mons. Joseph Hill (*H.T.*).—Salmon-pink flowers, shaded with yellow.

Mrs Aaron Ward (*H.T.*).—Indian yellow flowers, with pale edges.

Mrs Alfred Tate (*H.T.*).—Coppery-salmon flowers, shaded fawn.

Mrs A. R. Waddell (*H.T.*).—Reddish-orange flowers.

Mrs Arthur E. Coxhead (*H.T.*).—Claret-red flowers.

Mrs C. Curtis Harrison (*H.T.*).—Deep pink flowers.

Mrs C. E. Pearson (*H.T.*).—Orange-red flowers, with apricot shading.

Mrs Edward Powell (*H.T.*).—Scarlet flowers, shaded with crimson.

Mrs Herbert Stevens (*T.*).—White flowers.

Mrs James Lynas (*H.T.*).—Pearly-pink flowers.

Mrs Peter Blair (*H.T.*).—Lemon flowers, deeper in centre.

Mrs R. G. Sharman Crawford (*H.P.*).—Rosy-pink flowers.

Mrs T. Hillas (*H.T.*).—Chrome-yellow flowers.

Mrs Wakefield Christie-Miller (*H.T.*). — Blush and vermilion flowers.

Mrs W. J. Grant (*H.T.*).—Bright rosy-pink flowers.

Old Gold (*H.T.*).—Orange flowers, tinted with copper.

Ophelia (*H.T.*).—Salmon - flesh flowers, rosier in centre.

Pharisaër (*H.T.*).— Rosy-white flowers, shaded with salmon.

Prince Camille de Rohan (*H.P.*).—Dark crimson flowers.

Prince de Bulgarie (*H.T.*).—Pale rose flowers, shaded with apricot.

Queen Mab (*C.*).—Rosy-apricot flowers, shaded with orange.

Rayon d'Or (*P.*).—Golden-yellow flowers.

Red Letter Day (*H.T.*).—Scarlet-crimson flowers.

Richmond (*H.T.*).—Rich scarlet flowers.

Viscountess Folkestone (*H.T.*).—Creamy-white flowers, shaded with flesh.

Warrior (*H.T.*).—Crimson-scarlet flowers.

White Killarney (*H.T.*).—White flowers with creamy centre.

TALL-GROWING VARIETIES FOR BEDDING.—*Avoca* (*H.T.*).—Scarlet-crimson flowers.

Ben Cant (*H.P.*).—Deep crimson flowers.

Dupuy Jamain (*H.P.*).—Bright cerise flowers.

Florence H. Veitch (*H.T.*).—Scarlet-crimson flowers.

Frau Karl Druschki (*H.P.*).—Pure white flowers.

General Jacqueminot (*H.P.*).—Scarlet-crimson flowers.

Gruss an Teplitz (*H.T.*).—Scarlet-crimson flowers.

Gustave Régis (*H.T.*).—Nankeen-yellow flowers.

Hugh Dickson (*H.P.*).—Rich crimson flowers.

J. B. Clark (*H.T.*).—Scarlet flowers, shaded with plum.

Juliet (*P.*).—Flowers rosy-red inside of petals, and old gold outside.

La Tosca (*H.T.*).— Creamy-rose flowers.

Lady Waterlow (*H.T.*).—Salmon-pink flowers, edged with carmine.

Madame Wagram (*H.T.*).—Rose flowers, shaded with flesh-pink.

Mrs J. H. Welch (*H.T.*).—Rose-pink flowers.

Mrs John Laing (*H.P.*).—Soft pink flowers.

Mrs Stewart Clark (*H.T.*).—Cerise-pink flowers.

Simplicity (*H.T.*).—White, single flowers.

Ulrich Brunner (*H.P.*).—Cherry-red flowers.

Zephirine Drouhin (*H.B.*).—Carmine-pink flowers.

Roses for Buttonholes.—While it may be said that almost any rose, if not too large, can be used for buttonholes, there are some varieties, such as the following, that seem especially adapted to this purpose :—

Amateur Teyssier (*H.T.*).—White flowers with pale yellow centre.

Countess of Derby (*H.T.*).—Rose flowers with salmon centre.

Gustave Regis (*H.T.*).—Nankeen-yellow flowers.

Hugo Roller (*T.*).—Lemon-yellow flowers with rose edge.

Isabella Sprunt (*T.*).—Orange-yellow flowers.

Lady Hillingdon (*T.*). — Deep apricot-yellow flowers.

Lady Roberts (*T.*). — Reddish-apricot flowers.

Liberty (*H.T.*).—Brilliant crimson flowers.

Ma Capucine (*T.*). — Bronzy-yellow flowers, shaded with red.

Madame Chedane Guinoisseau (*T.*).—Canary-yellow flowers.

Madame Colette Martinet (*H.T.*).—Old gold flowers, shaded with orange.

MadameFalcot (*T.*).—Rich orange-yellow flowers.

Madame Jean Dupuy (*T.*).—Reddish-yellow flowers.

Madame Pernet Ducher (*H.T.*).—Canary-yellow flowers, becoming almost white.

Margaret Molyneux (*H.T.*).—Yellow flowers, shaded with pink.

Rosette de la Legion d'Honneur (*H.T.*).—Carnation-red flowers with yellow centre.

Safrano (*T.*).— Bright apricot flowers.

Souvenir de Catherine Guillot (*T.*).—Coppery-carmine flowers.

Sunrise (*T.*).—Carmine flowers with salmon-pink centre.

William Allen Richardson (*N.*).—Orange-yellow flowers.

In addition to these, many of the single roses, such as *Irish Elegance* and *Irish Fireflame,* are very fine in the bud state.

Roses for Exhibition : HYBRID PERPETUAL.—Though, for garden and decorative purposes, this class is being rapidly superseded by the Hybrid Teas, which more truly deserve the title of "perpetual," it still supplies a number of varieties of highest quality for exhibition. Indeed, for form and rich colour many of them are unsurpassable, and no collection could be deemed complete that did not include some of the following :—

Alfred Colomb. — Bright red flowers.

Alfred K. Williams.—Carmine-red flowers.

Baroness Rothschild.—Pale rose-pink flowers.

Beauty of Waltham.—Rosy-crimson flowers.

Ben Cant.—Deep crimson flowers with darker centre.

Candeur Lyonnaise. — White flowers, sometimes faintly tinted with pale lemon-yellow.

Captain Hayward.—Scarlet-crimson flowers.

Charles Lefebvre.—Brilliant crimson flowers.

Commandant Felix Faure.—Rich crimson-lake flowers, flushed with vermilion.

Comte de Raimbaud.—Dark carmine-cerise flowers.

Coronation.—Flesh flowers, shading to bright shrimp-pink.

Dr Andry. — Bright crimson flowers.

Duke of Edinburgh.—Bright vermilion flowers.

Duke of Wellington.—Velvety-red and crimson flowers.

Earl of Dufferin. — Velvety-crimson flowers, shaded with maroon.

E. Y. Teas.—Bright red flowers.

Fisher Holmes.—Dark crimson-scarlet flowers.

Frau Karl Druschki.—Pure white flowers.

George Arends.—A rose-coloured sort with " Druschki " flowers.

Gloire de Chédane Guinoisseau.—Crimson flowers.

Gustave Piganeau.—Brilliant carmine flowers.

Helen Keller.—Rosy-cerise flowers.

Her Majesty.—Clear rosy-pink flowers.

Horace Vernet. — Velvety-red flowers, shaded with dark crimson.

Hugh Dickson.—Brilliant crimson flowers.

Louis van Houtte.—Deep crimson flowers, shaded with maroon.

Madame Eugène Verdier.—Satiny-rose flowers.

Madame Gabriel Luizet.—Silvery-pink flowers.

Madame Victor Verdier.—Light crimson flowers.

Marchioness of Londonderry.—Ivory-white flowers.

Marie Baumann.—Bright carmine flowers.

Maurice Bernardin.—Vermilion flowers.

Mrs John Laing.—Soft pink flowers.

Mrs R. G. Sharman Crawford.—Deep rosy-pink flowers.

Oscar Cordel.—Bright carmine flowers.

Prince Arthur.—Deep crimson flowers.

Rev. Alan Cheales.—Pure lake flowers with silvery-white reverse.

Reynolds Hole.—Deep maroon flowers, shaded with crimson.

Suzanne Marie Rodocanachi.—Rosy-cerise flowers.

Ulrich Brunner. — Cherry - red flowers.

Ulster.—Bright salmon flowers.

Victor Hugo.—Rich crimson flowers, shaded with purple.

Xavier Olibo.—Velvety-crimson flowers.

HYBRID TEAS.—In this section additions are constantly being made, and the list of varieties suitable for exhibition is far too lengthy to be included here in its entirety. Many of those given here are good also for bedding and decoration, the treatment, of course, being somewhat different. The following list comprises sixty varieties that are well up to exhibition standard, but does not include any introduced since 1915 :—

Alice Cory Wright.—Deep pink flowers.

Alice Lindsell. — Creamy-white flowers with pink centre.

Augustus Hartmann.—Geranium-red flowers.

Avoca.—Scarlet-crimson flowers.

Bessie Brown. — Creamy-white flowers.

British Queen. — Pure white flowers.

Caroline Testout. — Silvery-pink flowers.

Charles de Lapisse. — Blush flowers.

Claudius.—Bright rose flowers.

Colleen.—Bright rose flowers, shaded with pink.

Countess Clanwilliam. — Pink flowers tipped with red.

Dean Hole.—Carmine flowers, shaded with salmon.

Dr O'Donel Browne.—Carmine-rose flowers.

Duchess of Normandy.—Salmon-flesh flowers, paling to cream at the edges.

Earl of Gosford.—Dark crimson flowers.

Earl of Warwick.—Salmon-pink flowers, shaded with rose.

Edward Bohane.—Velvety-crimson flowers.

Edward Mawley.—Deep velvety-crimson flowers.

Elizabeth.—Deep rosy-pink flowers, lighter on the outer petals.

Ferniehurst.—Coppery, rose-pink flowers, on fawn base.

Florence Forrester.—Snow-white flowers with a lemon tinge.

Florence Pemberton.—Creamy-white flowers, edged blush.

George Dickson.—Velvety-black crimson flowers.

Gladys Harkness.—Deep salmon-pink flowers.

H. Vessey Machin.—Scarlet-crimson flowers.

His Majesty.—Dark crimson flowers.

J. B. Clark.—Deep scarlet flowers, shaded with plum.

Jonkheer J. L. Mock.—Deep pink flowers with a silvery reserve.

King George V.—Blackish-crimson flowers with a violet flush.

Lady Helen Vincent.—Shell-pink flowers.

Lady Moyra Beauclerc.—Madder-rose flowers with a silvery reflex.

Lady Ursula.—Flesh-pink flowers.

Leslie Holland.—Scarlet-crimson flowers with a deeper shading.

Lohengrin.—Silvery-pink flowers with a deep pink centre.

Lyons-Rose.—Shrimp-pink flowers with a coral-red centre.

Mabel Drew.—Deep cream flowers, passing to canary-yellow.

Madame Maurice de Luze.—Rose-pink flowers with a carmine centre.

Madame Wagram (Syn. *Comtesse de Turenne*).—Rose flowers, shaded with flesh-pink.

Margaret.—Soft pink flowers.

Marquise de Ganay.—Silvery-pink flowers.

Marquise Litta.—Rosy-carmine flowers.

Mildred Grant.—Ivory-white flowers, tinted with peach.

Mrs Ambrose Riccardo.—Deep honey-yellow flowers.

Mrs Andrew Carnegie.—Pure white flowers.

Mrs Archie Gray.—Light canary-yellow flowers.

Mrs Charles Russell.—Rosy-carmine flowers.

Mrs Cornwallis West.—Delicate pinkish-white flowers.

Mrs David McKee.—Creamy-yellow flowers.

Mrs George Norwood.—Bright pink flowers.

Mrs James Lynas.—Pearly-pink flowers.

Mrs J. H. Welch.—Rose-pink flowers.

Mrs Muir Mackean.—Carmine-crimson flowers.

Mrs R. D. McClure.—Salmon-pink flowers.

Mrs Richard Draper.—Rosy-pink flowers; silvery-flesh on inside of the petals.

Mrs Theodore Roosevelt.—Creamy-white flowers.

Naarden.—Creamy-white flowers with salmon centre.

Oberhofgartner Terks.—Light salmon-pink flowers.

Queen of Spain.—Pale flesh-coloured flowers with darker centre.

St Helena.—Cream flowers with blush centre.

William Shean.—Pink flowers.

TEAS.—In this section are to be found some of the most beautiful of all Roses, and in many exhibitions special classes are given over to them. The following are some of the best exhibition varieties:—

Alexander Hill Gray.—Clear lemon-yellow flowers.

Anna Olivier.—Rosy-flesh and buff flowers.

Bridesmaid.—Bright pink flowers.

Catherine Mermet.—Light rosy-flesh flowers.

Comtesse de Nadaillac.—Peach flowers, shaded apricot and coppery-yellow.

Freiherr von Marschall.—Crimson flowers, opening to rose.

Innocente Pirola.—Cream flowers, tinted with pink.

Lady Plymouth.—Ivory flowers, faintly flushed.

Madame Constant Soupert.—Golden-yellow flowers.

Madame de Watteville.—Cream flowers, tinted with rose.

Madame Jules Gravereux.—Flesh-coloured flowers, shaded with yellow.

Maman Cochet.—Pale pink flowers, shaded with salmon.

Maréchal Niel.—Golden-yellow flowers.

Medea.—Lemon flowers with deeper centre.

Molly Sharman Crawford.—Eau-de-nil white flowers.

Mrs Campbell Hall.—Creamy-buff flowers, suffused with rose.

Mrs Edward Mawley.—Carmine flowers, shaded with salmon.

Mrs Foley Hobbs.—Ivory-white flowers with a faint flush of pink on the edges of the petals.

Mrs Herbert Hawkesworth.—Creamy-white flowers.

Mrs Hubert Taylor.—Creamy-white flowers, suffused with pale rose.

Mrs Myles Kennedy.—Silvery-white flowers, shaded buff.

Muriel Grahame.—Pale cream flowers, flushed with rose.

Rubens.—White flowers, shaded creamy-rose.

Souvenir d'Elise Vardon.—Creamy-white flowers with centre tinted rose.

Souvenir d'un Ami.—Pale rose flowers.

Souvenir de Pierre Notting.—Apricot-yellow flowers, shaded with orange.

Souvenir de S. A. Prince.—Pure white flowers.

The Bride.—White flowers, tinged with lemon.

W. R. Smith.—White flowers, flushed with rosy-pink.

White Maman Cochet.—White flowers, tinged with blush.

Roses for Fragrance.—To many growers fragrance is a matter of no moment, compared with form and colour; but to others it is a keen disappointment that so many fine Roses lack this charm. In the old-fashioned Hybrid Perpetuals fragrance was more common than it is among the present race of Hybrid Teas; it is, however, satisfactory to note that many of these are deliciously scented, and some raisers make this one of their ideals. In the lists of Roses for Exhibition and for Bedding are some in which fragrance is especially pronounced, and their names are here given. It must not be assumed, however, that all those not mentioned are absolutely scentless.

FRAGRANT HYBRID PERPETUALS.—*A. K. Williams, Charles Lefebvre, Coronation, Dupuy Jamain, Fisher Holmes, General Jacqueminot, Horace Vernet, Hugh Dickson, Madame Victor Verdier, Marie Baumann, Mrs John Laing, Prince Camille de Rohan, Ulrich Brunner, Xavier Olibo.*

FRAGRANT HYBRID TEAS.—*Augustine Guinoisseau, Avoca, Betty, British Queen, Chateau du Clos Vougeot, Claudius, Dorothy Page-Roberts, Dr O'Donel Browne, Duchess of Wellington, Ecarlate, Edward Mawley, Florence H. Veitch, General McArthur, George Dickson, Gladys Harkness, Gruss an Teplitz, Gustav Grünerwald, La France, Lady Alice Stanley, Lady Helen Vincent, Lieut. Chauré, Mabel Drew, Madame Abel Chateney, Madame Maurice de Luze, Madame Ravary, Mrs A. Carnegie, Mrs Alfred Tate, Mrs Arthur E. Coxhead, Mrs J. H. Welch, Mrs Muir MacKean, Mrs Peter Blair, Mrs Stewart Clark, Old*

Gold, Princess Mary, Richmond, Viscountess Folkestone.

FRAGRANT TEAS.—Practically all the Roses in this section have the special "Tea" fragrance in varying degree.

Roses for Greenhouse and Conservatory.—For pot culture under glass the varieties suitable are countless, and to name a few of the best is all that is possible here. They are as follows: *British Queen* (*H.T.*); *Candeur Lyonnaise* (*H.P.*); *Caroline Testout* (*H.T.*); *Catherine Mermet* (*T.*); *Charles de Lapisse* (*H.T.*); *Constance* (*P.*); *Covent Garden* (*H.T.*); *Earl of Warwick* (*H.T.*); *Edward Mawley* (*H.T.*); *Exquisite* (*H.T.*); *Florence Pemberton* (*H.T.*); *Frau Karl Druschki* (*H.P.*); *General McArthur* (*H.T.*); *Golden Ophelia* (*H.T.*); *Hadley* (*H.T.*); *Hoosier Beauty* (*H.T.*); *Iona Herdman* (*H.T.*); *Killarney* (*H.T.*); *Lady Alice Stanley* (*H.T.*); *Lady Hillingdon* (*T.*); *Lady Pirrie* (*H.T.*); *Leslie Holland* (*H.T.*); *Liberty* (*H.T.*); *Lieut. Chauré* (*H.T.*); *Madame Abel Chateney* (*H.T.*); *Madame Edouard Herriot* (*P.*); *Madame Hoste* (*T.*); *Madame Leon Pain* (*H.T.*); *Melody* (*H.T.*); *Mrs A. Carnegie* (*H.T.*); *Mrs D. Jardine* (*H.T.*); *Mrs George Norwood* (*H.T.*); *Mrs George Shawyer* (*H.T.*); *Mrs Herbert Stevens* (*T.*); *Mrs Joseph H. Welch* (*H.T.*); *Niphetos* (*T.*); *Old Gold* (*H.T.*); *Ophelia* (*H.T.*); *Pharisaër* (*H.T.*); *Prince de Bulgarie* (*H.T.*); *Princess Mary* (*H.T.*, single); *Rayon d'Or* (*P.*); *Richmond* (*H.T.*); *Safrano* (*T.*); *Souvenir de Pierre Notting* (*T.*); *The Bride* (*T.*); *Ulrich Brunner* (*H.P.*); *Viscountess Folkestone* (*H.T.*); *White Killarney* (*H.T.*); *William Shean* (*H.T.*).

CLIMBERS.—*Climbing Devoniensis* (*T.*); *Climbing Liberty* (*H.T.*); *Climbing Mrs W. J. Grant* (*H.T.*); *Climbing Niphetos* (*T.*); *Climbing Souvenir de Pierre Notting* (*T.*); *E. Veyrat Hermanos* (*T.*); *Fortune's Yellow* (*N.*); *Maréchal Niel* (*N.*); *Tausendschön* (climbing polyantha); *W. A. Richardson* (*N.*).

Roses for Hedges. — Where a hedge of moderate height is required, there are many fine Roses available. Impenetrability can be secured by planting in a double row, the back alternating with the front, with a space of 2½–3 ft. between the bushes. Any of the strong-growing China Roses are suitable, also the varieties of *Rosa rugosa*, and the Hybrid Sweet Briars. Particulars of these will be found in the article on *Rose Classes*, which see. The following are specially recommended :—

Fellenberg (*N.*), rosy-crimson; *Gruss an Teplitz* (*H.T.*), bright crimson, semi-double; *Moyesii* (species), dull crimson, single, with yellow stamens; *Stanwell Perpetual* (Perpetual Scotch), pale blush; *Xanthina* (species), pale yellow, single; and *Zéphirine Drouhin* (*H.B.*), silvery-pink, semi-double.

TALLER HEDGES.—These require to be trained to wires strained between stout posts. Varieties suitable are the AYRSHIRES, HYBRID WICHURAIANAS, and RAMBLERS, which are described in the article on *Rose Classes*.

Roses for Pegging-down.—Where space allows, many Roses of vigorous habit, making long shoots, can be pegged down instead of being pruned back. Thus treated, they bloom along their entire length, and are wonderfully decorative. At the end of the season the growths that have bloomed are cut away, and the new shoots are bent back carefully and secured in their place. Among those that lend themselves to this treatment are the following :—

Avoca (*H.T.*); *Frau Karl Druschki* (*H.P.*); *General Jacqueminot* (*H.P.*);

Gloire Lyonnaise (*U.T.*); *Gruss an Teplitz* (*H.T.*); *Gustave Régis* (*H.T.*); *Hugh Dickson* (*H.P.*); *J. B. Clark* (*H.T.*); *Juliet* (*P.*); *La France* (*H.T.*); *Madame Isaac Periere* (Bourbon); *Madame Jules Gravereux* (*T.*); *Mrs Stewart Clark* (*H.T.*); *Ulrich Brunner* (*H.P.*); *Zéphirine Drouhin* (*H.B.*).

Roses for Pillars.—For this purpose the Hybrid Bourbons, Hybrid Teas, Noisettes, Ramblers, Teas, and Wichuraianas recommended under ROSES FOR ARBOURS, ARCHES AND PERGOLAS are suitable; but as pillars are not necessarily so tall other varieties are also available. It is not possible in the space at command to give more than a selection, and as many of them are referred to in other paragraphs or in the article on *ROSE CLASSES*, the colours are not repeated: *Ards Pillar* (*H.T.*); *Bardou Job* (*H.T.*); *Billard et Barré* (*T.*); *Effective* (*H.T.*); *François Crousse* (*T.*); *Gruss an Teplitz* (*H.T.*); *Gustave Régis* (*H.T.*); *J. B. Clark* (*H.T.*); *Lady Waterlow* (*H.T.*); *Madame Jules Gravereux* (*T.*); *Mrs Rosalie Wrinch* (*H.T.*, single); *Papillon* (*T.*); *Rosette de la Légion d'Honneur* (*H.T.*); *Waltham Climber* (*H.T.*).

Roses for Walls.—The fact that a Rose is of so-called climbing habit does not necessarily imply that it is suitable for growing on a wall or close fence, such positions being often too warm, while preventing the free exposure of the growths to air and sun. Others, however, are not so particular, or by reason of being more or less tender should have a warm south or west wall. There are a few Roses that will thrive on cool east and north walls, and a selection of each follows:—

CLIMBERS FOR COLDER POSITIONS. —*Ayrshire Roses*; *Bouquet d'Or* (*DIJON T.*); *Climbing Caroline Testout* (*H.T.*); *Climbing Mrs W. J. Grant* (*H.T.*); *Félecité et Perpétue* (sempervirens, creamy-white); *Gerbe Rose* (*W.*); *Gloire de Dijon* (*T.*); *Longworth Rambler* (*H.T.*); *Madame Alfred Carrière* (*N.*); *René André* (*W.*); *Ruby Queen* (*W.*).

CLIMBERS FOR WARM WALLS.—*Banksian Roses* (white and yellow); *Bardou Job* (*H.T.*); *Billard et Barré* (*T.*); *Climbing Aimée Vibert* (*N.*); *Climbing Liberty* (*H.T.*); *Climbing Mrs W. J. Grant* (*H.T.*); *Climbing Papa Gontier* (*H.T.*); *Climbing Richmond* (*H.T.*); *Climbing Souvenir de la Malmaison* (*H.B.*); *Fortune's Yellow* (*N.*); *François Crousse* (*T.*); *Lady Waterlow* (*H.T.*); *Lamarque* (*N.*); *Longworth Rambler* (*H.T.*); *Madame Alfred Carrière* (*N.*); *Madame Berard* (*T.*); *Madame Jules Gravereux* (*T.*); *Rêve d'Or* (*N.*); *sinica* (species, white); *sinica Anemone* (hybrid of species, rosy-pink); *W. A. Richardson* (*N.*); *Zéphirine Drouhin* (*H.B.*).

To conclude, we give selections of Evergreen Roses and Single Roses, as both these are very popular in some districts:—

Evergreen Roses. — Evergreen Roses are few in number, if we exclude the Wichuraianas, which sometimes carry the old foliage through until the new leaves are out. But this depends on the character of the winter and the situation where they are grown. *Dorothy Perkins*, *Gardenia*, *Joseph Billard*, *Lady Gay*, and *Robert Craig* may be cited as almost evergreen, while *Edmund Proust* and *Jersey Beauty* are even more persistent. At one time there were several varieties of *Rosa sempervirens*, the EVERGREEN ROSE, in cultivation, but they are now practically unknown, three only surviving, namely:—

Félicité et Perpétue. — Creamy-white flowers.

Flora.—Bright rose flowers.

La Guirlande.—Almost pure white flowers.

The Ayrshire Roses (see article on *Rose Classes*) are also evergreen under ordinary conditions, *i.e.*, except in severe winters; and at least one Tea, *Madame Antoine Mari* (blush-white), is characterised by being nearly evergreen. In sheltered places many of the ordinary Roses retain their foliage almost through the winter.

Single Roses.—The Wichuraianas and Climbing Polyanthas have many varieties bearing single flowers; Hybrid Sweet Briars and various species are also single or semi-double; but there is a class of single-flowered Roses which has achieved great popularity in recent years, alike for their usefulness in the garden, and for indoor decoration, in which their lightness is a strong recommendation. Some of them have more than a single row of petals. Among the best may be mentioned:—

Gottfried Keller (*P.*).—Deep yellow and pink flowers.

Irish Beauty (*H.T.*).—Pure white flowers.

Irish Elegance (*H.T.*).—Bronzy-orange in bud, but opens to apricot.

Irish Fireflame (*H.T.*).—Fiery-orange, but opens to pale pink.

Irish Glory (*H.T.*).—Deep red flowers.

Isobel (*H.T.*). — Carmine-red flowers with copper shading.

Mrs Rosalie Wrinch (*H.T.*).—Deep salmon-pink flowers.

Paul's Single White (*H.P.*).—White flowers.

Princess Mary (*H.T.*).—Scarlet-crimson flowers.

Red Letter Day (*H.T.*).—Deep scarlet crimson flowers.

Simplicity (*H.T.*).—Pure white flowers.—W. J. C.

ROSES FOR BEDDING.—See *Roses for All Purposes.*

ROSES FOR CITY GARDENS.—See *Town and City Gardening.*

ROSES FOR EXHIBITION.—See *Roses for All Purposes.*

ROSES: Planting. — See *Rose Planting.*

ROSES: Pruning. — See *Pruning Roses* and *Shrubs.*

ROSES: Single.—See *Roses for All Purposes.*

ROSES: Top-dressing for. — See *Top-dressing.*

ROSETTE COLEWORT.—See *Colewort.*

ROSETTE MULLEIN.—See *Ramondia.*

ROSIN WEED.—See *Silphium.*

ROSMARINUS.—For the best species see *Shrubs.*

ROTATION IN THE FLOWER GARDEN. — As a general rule rotation, such as should be practised in the vegetable or kitchen garden, is quite impossible among the flowers. Herbaceous borders are made and planted, and have to last for years, and even when lifting and replanting is done very often it is necessary that the same plants should occupy the same positions. And does it matter? No, not much, perhaps comparatively little, but then we overrule the need for rotation by heavy manuring from time to time and by frequent top-dressings and feeding.

It does happen at times, however, that a plant ceases to do well in any particular position, and here comes in the need for a little rotational work. Study the plant first. Has it a leguminous root, namely, a root with little nitrogen-containing nodules on it? If so, plant it in a site not previously occupied by any similar or leguminous plant. Has it a long tap-root? If so, plant it in ground previously occupied by a surface and fibrous-rooted flower, or *vice versa.* As a general rule, where sickness of this kind is noticed, plants of any one natural order should not be planted in ground immediately occupied previously by plants of the same order; but as the natural orders (which are always given in the plant articles in this work) contain plants of very varying characteristics, this rule must not be made "a law of the Medes and Persians which altereth not." Common sense and judgment should be used in this, as in every other operation in gardening.

In the case of annuals and summer bedding plants rotation is quite easy, and, though not essential, is exceedingly advisable, more especially if manure and liquid food have to be economically used. Plants of different natural orders, and plants with different characteristics take different food materials from the soil, thus subjects making much foliage will rob the ground of most of its nitrogen; subjects flowering quickly which are soon over will rob their sites of most of the phosphates they contain; the subjects blooming for a very long period, and producing flowers of high quality and in large quantity will take out of the soil a good portion of the potash it contains. Very often an annual, rooting near the surface of the soil, will decline in flower production year by year, until it is a total failure, whereas if one of the same natural order, but with long tap-roots, is sown, it will be a crowning success for several years. In other words, the surface soil may be totally devoid of the food required by that plant, and yet the under-soil be full to overflowing with it.

The above will serve to show that while no definite hard-and-fast rules for flower garden rotation can be laid down, the general principles of rotation will, if applied to the flower garden as well as the vegetable plot, give increased returns and far more successful results. Sickness of plants is to a large extent avoidable in the writer's opinion, if plants, their families, and requirements are studied from the point of view of rotation.—E.

ROTATION OF CROPS: AND DOUBLE CROPPING. — Rotational cropping is a system in which vegetables of the same character or those closely related in some way do not follow one another on the same piece of ground year after year. For instance, certain plants root deeply while others have fibrous surface roots, so that by alternating, say, carrots and lettuces we utilise to the utmost the manurial substances in the ground. As is well known, too, plants of one family such as the cabbage and turnip group, take a lot of one or two plant foods from the soil, while others such as onions need those foods scarcely touched by the former; less manure and more economical cropping are thus the direct results of applying the principle of rotation in these cases. The pea and bean family, on the other hand, actually enrich the soil in some respects, and thus make it fit to yield large and profitable quantities of cabbages and lettuces, while there are many garden crops that need lavish supplies of farmyard manure, such as leeks and potatoes, that can be followed by those merely requiring a rich soil without fresh manure, *e.g.* parsnips, beet, etc.

Cropping Rules.—While it must not be forgotten that local conditions may vary the cropping to a certain extent, there are certain fairly hard-and-fast rules for guidance. Beet, carrots, parsnips, and scorzonera, which must not have fresh manure, should follow heavily dunged crops such as cabbages, celery, leeks, lettuces, onions, and turnips, top-dressings of nitrates being only permissible for these root crops when they are young. Cabbages and turnips may follow beans, celery, leeks, lettuces, onions, peas, or potatoes, as they grow freely in good fresh soil heavily manured. Broad beans, French beans, peas, and so on do splendidly in ground previously occupied by celery, leeks, lettuces, onions, and potatoes; they love a deeply tilled soil and good manure without much nitrogenous food. Potatoes grow well after almost any crop; they love a loose soil well manured. Strawberries, hardy perennials, roses, fruit bushes, asparagus, and long-standing crops do best in a soil which has borne a few crops of beans, lettuces, or potatoes.

Rotational Cropping. — Rotation systems are the results of wide experience and practical reasoning. Every gardener must work out his own system and he will soon reap the benefit of good systematic work in healthy plants, free from pests or weeds, and the keeping of the soil fertility at a good average standard. We give here two of the best rotations, and readers should model their own systems on these, varying the procedure according to their local climate, soil, manure available, and kitchen requirements.

THREE YEAR ROTATION. — The garden is divided, mentally or practically, into three plots, in each of which are grown different groups of plants, as in the following table:

First Year.		Second Year.	Third Year.
Plot 1 . .	Group A	Group B	Group C
Plot 2 . .	„ B	„ C	„ A
Plot 3 . .	„ C	„ A	„ B

FOUR YEAR ROTATION. — The garden is here divided mentally into four plots, and different crops are raised annually on them as follows:—

First Year.		Second Year.	Third Year.	Fourth Year.
Plot 1 .	Group D	Group E	Group F	Group G
„ 2 .	„ G	„ D	„ E	„ F
„ 3 .	„ F	„ G	„ D	„ E
„ 4 .	„ E	„ F	„ G	„ D

CROPPING GROUPS.—In the above two tables *Group A* consists mainly of broad beans, cabbages, French beans, kohl rabi, peas, runner beans, swedes and turnips.

Group B consists of beet, carrots, celery, leeks, lettuces, onions, parsley, and parsnips.

Group C consists of potatoes only.

Group D also consists of potatoes only.

Group E consists of peas and all kinds of beans, as well as celery, leeks, lettuces, and onions.

Group F consists of beet, carrots, parsnips, salsafy, and scorzonera without any manure, with parsley, shallots, and any seedlings to be transplanted; while

Group G consists of cabbages, cauliflowers, kohl rabi, lettuces, savoys, spinach, swedes and turnips.

Double Cropping or Successional Cropping.—As soon as one crop is cleared from a piece of ground another should be planted out in the same ground, especially in the case of such crops as early potatoes, peas, cabbages, spring onions, early turnips, or those which have occupied the ground over winter and mature early in the season. The ground merely needs to be lightly forked over (but even this will be unnecessary in the case of early potatoes), and raked level as soon as the first crop has been cleared off. A heavy manuring for the first crop and a judicious rotational system such as already described is advisable, but double cropping will not entail a fresh application of farmyard manure for the second crop, though in a starved light soil this is often advisable. The ideal method is to apply a light dressing of artificials to urge on the second crop, though even this is not essential.

As regards examples of this kind we may mention that any crop may follow early potatoes; after peas, we can plant lettuces, spinach, intermediate or shorthorn carrots, winter broccoli, early kale, early turnips, swedes, or purple-top turnips, winter leeks, etc.; while after cabbages any crop save turnips or other members of the Brassicæ may be successfully planted. The idea is obvious—to snatch from the soil before the winter some crop which matures in a short space of time. As a place must be found in every garden for transplanting Wallflowers, Canterbury Bells, Sweet Williams, seedling perennials, violas, pansies, or summer cuttings of pinks, carnations, and other plants, the vacant area will be just in time for this; they can be left here until the end of autumn or spring, when they will, of course, be transplanted into their flowering sites.

A litle forethought may even secure a third crop annually from one piece of ground, *e.g.* early potatoes, lettuces, spring-maturing broccoli; early peas, spinach, spring cabbages; peas, shorthorn carrots, and spring cabbages; winter broccoli, carrots, viola seedlings, and so on; each of the three planted in succession.

In a few instances one crop may be planted before the other is actually lifted. Instances of this may be given where brussels sprouts, savoys, and kale are dibbed in between rows of early potatoes; the potatoes are lifted and the Brassicæ left to grow on. Spinach, leeks, vegetable marrows, and swedes may be sown or planted alongside early peas; when the pea haulm is removed they can have space to mature, nor do they resent the shade as seedlings. French beans, runner beans, vegetable marrows, and leeks may be planted in the cabbage patch before the cabbages are mature, provided, of course, that they are not too close; instead of being checked these plants will actually thrive under the leafy wings of the cabbages, and when they begin to develop the cabbages will be in demand.

Lastly, a good garden is far too valuable to leave vacant for even a week or two. If no plants are ready, sow the area down with rape, mustard, rye-grass, comfrey, or any cheap seed producing soft leafy herbage (see article on *Green Manuring*); dig the plants in just before the rigours of winter, thus conserving the manurial elements already in the soil, adding to the store and materially bettering the physical condition of the ground. With good tillage, liberal manuring, and, above all, organisation, a keen gardener may easily double or treble the weight of his garden produce.

H. H. A.

See also under General Management in *Vegetables: General Considerations.*

ROTTED LAWN MOWINGS. — See *Lawn Mowings.*

ROUEN LILAC (*Syringa chinensis*).—See *SHRUBS.*

ROUGH BINDWEED (*Smilax aspera*). See *CLIMBING AND TRAILING PLANTS.*

ROUGH CHERVIL (*Anthriscus sylvestris*).—See *ANTHRISCUS.*

ROUGH DIGGING AND RIDGING.—See *SOIL CULTIVATION.*

ROUGH GREENHOUSES. — See *GREENHOUSE: BUILDING AND HEATING.*

ROUGH MORTAR.—See *MORTAR.*

ROUND-HEADED BUSH CLOVER (*Lespedeza capitata*).—See *SHRUBS.*

ROVE BEETLES.—See under MUSHROOM PESTS in *INSECT PESTS.*

ROWAN (*Pyrus Aucuparia*) and **ROWAN TREE** (*Pyrus Aucuparia*). See *TREES.*

ROYAL FERN (*Osmunda regalis*).—See *FERNS AND FERN GARDENING.*

ROYAL PALM (*Oreodoxa regia*).—See *PALMS.*

RUBBISH.—See *BURNING GARDEN RUBBISH.*

RUBIA (MADDER. Nat. Ord. Rubiaceæ).—This is a genus chiefly of hardy herbaceous perennials none of which are of any value for British gardens though of very easy culture. *R. peregrina,* the WILD MADDER, is probably the best known, though *R. tinctorum,* the DYER'S MADDER, is more useful. *R. cordifolia* (Syns. *R. alata* and *R. chinensis*), as well as *R. sikkimensis,* are sometimes grown. They mostly bear yellow or whitish flowers in July, and average 1–4 ft. in height.

RUBUS.—For the best species see *CLIMBING AND TRAILING PLANTS* and *SHRUBS.*

RUDBECKIA (CONE-FLOWER. Nat. Ord. Compositæ). — This is a well-known genus of beautiful hardy perennial border plants suitable alike for mixed flower borders, for shrub borders, and margins to the wild garden. The flowers are deservedly most highly prized for cutting in the late summer and autumn, especially those of *R. laciniata.* Some of the species which used to be included in the genus now occupy positions in other genera, such as *Echinacea, Helenium,* and *Lepachys.* Articles on the first two appear in their proper place, but as the species of the last-named are quite unimportant they are excluded from the present edition of this work.

Culture of Rudbeckias, or CONE-FLOWERS, as they are popularly termed, is a matter of extreme ease. They do well in ordinary garden soil, and once planted will spread quite quickly. It is desirable to lift and divide the clumps once in three or four years, and as some of them grow very tall, prompt and efficient staking is necessary. Propagation alike by seeds sown in the summer, or by root division from October to March, is remarkably easy, and planting may be carried out with every prospect of success from November to early April.

What to Grow.—We recommend the following species :—

Rudbeckia amplexicaulis (Syn. *R. amplexifolia*).—This is a very useful yellow sort blooming in July and August, which averages about 1 yd. in height.

R. bicolor.—This is a useful pale yellow sort, with an outer circle of brown. It blooms from July to August, and grows 1½–3 ft. in height.

R. digitata.—Syn. *R. lacinata angustifolia,* which see.

R. grandiflora.—This bears large yellow flowers from July to September, and grows 2–4 ft. high.

R. lacinata.—This is probably the most popular species of all, with its large yellow flowers in August and September, on plants often over 6 ft. high. There are several good varieties of it ; for instance, *angustifolia* (Syn. *R. digitata*) is a robust form with golden-yellow flowers ; *flora plena* is a fine double yellow, and

Golden Glow needs no description, save that it is worthy of its name. All these bloom with remarkable freedom from August to September, and average 6 ft. in height.

R. maxima.—This is the tallest sort of all, and more suitable for shrub borders or the wild garden than anywhere else. It produces light lemon-yellow flowers in August and September, and grows 6–10 ft. in height.

R. Newmani.—This sort so often offered by nurserymen as a distinct species is synonymous with *R. speciosa* below.

R. speciosa (Syn. *R. Newmani*).—This is a deservedly popular species bearing large bright golden-yellow flowers surrounded by an almost black zone, from June to October. Many fanciful names such as BLACK-EYED SUSAN have been applied to this plant, which grows 2–5 ft. in height.

RUE.—The genus RUTA or *R. graveolens.* See *POTHERBS*, *RUTA*, and *SHRUBS.*

RUE ANEMONE (*Thalictrum anemonoides*).—See *THALICTRUM.*

RUGOSA ROSES.—See *ROSE CLASSES.*

RUM CHERRY (*Prunus serotina*).—See *TREES.*

RUMEX (DOCK. Nat. Ord. Polygonaceæ).—Most of the members of this genus are weeds of no value, but of a very troublesome nature in the garden, needing most careful taking out on account of their long roots. Thus we have *R. Acetosella*, the SHEEP SORREL; *R. alpinus*, the MONK'S RHUBARB; *R. Hydrolapathum* (Syn. *R. aquaticus*), the GREAT WATER DOCK; *R. hymenosepalus*, the WILD PIE PLANT; *R. maritimus*, the GOLDEN DOCK; *R. obtusifolius*, the BUTTER DOCK; *R. Patientia* (Syn. *R. olympicus*), the PATIENCE DOCK; *R. pulcher*, the FIDDLE DOCK; *R. sanguineus*, the well-known BLOODWORT; *R. scutatus*, the FRENCH SORREL; and *R. vesicarius*, the BLADDER DOCK. Some of these have medicinal value; for these see article on *MEDICINAL HERBS.* The most useful species is *R. Acetosa*, the COMMON SORREL, or SORREL, sometimes grown as a vegetable, as described in our article on *SORREL.*

RUNNER BEANS.—See *BEANS.*

RUNNER BEANS IN SALT.—See *VEGETABLE BOTTLING.*

RUNNING MUTISIA (*Mutisia decurrens*). — See *CLIMBING AND TRAILING PLANTS.*

RUNNING OAK (*Quercus pumila*). — See *TREES.*

"RUNNING OFF" IN BLACK CURRANT.—See under REVERSION IN BLACK CURRANT in *DISEASES OF PLANTS.*

RUSH.—See *JUNCUS.*

RUSH-LEAVED DAFFODIL (*Narcissus juncifolius*).—See *NARCISSUS SPECIES.*

RUSSIAN ALMOND (*Prunus nana*).—See *TREES.*

RUST FUNGI.

The Rust Fungi, scientifically known as the Uredineæ, consist of a large group of parasitic fungi which attack all classes of plants, and sometimes cause considerable damage. The fungi themselves are minute, and live within the tissue of their host-plants, but produce sori or clusters of yellow or brown spores, which, as they occur in great profusion, often give a yellow or brown appearance to the plants. Hence the term "Rust Fungi." In ordinary garden *parlance* the word "rust" is used loosely to describe almost any brown discoloration due to any cause, but it is advisable to limit the term to diseases produced by the true Rust Fungi or Uredineæ. Examples of these are the rusts of Asparagus, Bean, Black Currant, Carnation, Chrysanthemum, Hollyhock, Mint, Rose, and Violet.

The life-history of the Uredineæ is rather complicated, since many of them possess different spore-stages which follow each other in regular succession. In the most highly organised, four spore-forms are present, but in others two or three only occur, and in some one only is known. When the full sequence is present the first form is the *Aecidiospore* or cluster-cup stage, where the spores, usually golden in colour, are arranged in minute cups. These are produced mostly in spring, *e.g.* Anemone and Mint Rust. This is followed by the *Uredo*, or summer-spore stage, which is often very destructive, the spores being produced in great profusion and spreading the disease rapidly. Later comes the resting or *Teleutospore* phase, which consists typically of thick-walled resting spores which lie dormant till spring, when they germinate on dead leaves or on the ground, and give rise to other spores (*Basidiospores*) from which the cluster-cup stage is produced.

A further complication lies in the fact that rust fungi are sometimes heteroecious, that is, they require two hosts to complete their life-history. In the Pear Cluster-Cup, for instance, the *Aecidial* stage is on the Pear, but the *Teleutospore* stage exists on the Juniper. As a rule, the mycelium is localised, and a very large number of separate infections occur on any one plant, in which case it is usually annual, and the mycelium itself, though not the resting spores, dies with the leaf-fall in autumn, *e.g.* Hollyhock or Chrysanthemum Rust. In other cases the mycelium is distributed right through the plant, and in this case is usually perennial, *e.g.* Mint Rust.

Means of Control.—It will be obvious from the above that the only way intelligently to combat the rust fungi is to ascertain the outline of the life-cycle. Information as to this is indicated under each species dealt with in this work. When the life-cycle is understood, common sense will largely suggest the most successful methods of control.—A. D. C.

RUSTIC FURNITURE.—See *GARDEN FURNITURE.*

RUTA (RUE. Nat. Ord. Rutaceæ).

The members of this genus are herbs of no value for the ordinary garden, but useful in the herb border. They must not be confused with MEADOW RUES described in our article on *THALICTRUM* which are highly attractive foliage and flowering plants for perennial parterres. There are various species, such as *R. bracteosa*, SICILIAN RUE, and *R. patavina*, the PADUA RUE. The most useful is, however, *R. graveolens*, the COMMON RUE, or known just as RUE, under which name a few remarks on its culture will be found in our article on *POTHERBS.*

See also *SHRUBS.*

RYE.—See *SECALE.*

RYE GRASS.—The popular name of *LOLIUM*, which see.

RYE GRASS, ITALIAN (*Lolium multiflorum*).—See *LOLIUM.*

S

SACCOLABIUM.—See article on *ORCHIDS.*

SACRED FIR (*Abies religiosa*).—See *TREES.*

SAFFLOWER (*Carthamus tinctorius*). See *CARTHAMUS.*

SAFFRON and SAFFRON CROCUS (*Crocus sativus*).—See *COLCHICUM* and under CROCUS in *MEDICINAL HERBS*; and see also SPECIES AND HYBRIDS under SPECIES AND VARIETIES in *CROCUS.*

SAFFRON, MEADOW. — A name applied to the genus *COLCHICUM.* Culture is given under CROCUS, AUTUMN, in *MEDICINAL HERBS.*

SAGE (*Salvia officinalis*).—See *POT-HERBS* and *SALVIA.*

SAGE-BUSH (*Artemisia procera*).—See *SHRUBS.*

SAGE WILLOW (*Salix candida*).—See *TREES.*

SAGENIA.—Now included in the genus NEPHRODIUM. See *FERNS AND FERN GARDENING.*

SAGHALIEN FIR (*Abies sachalinensis*). See *TREES.*

SAGINA (PEARL-WORT. Nat. Ord. Caryophyllaceæ).—This is a genus of dwarf-growing annual weeds of no value for the garden.

SAGITTARIA (ARROW-HEAD. Nat. Ord. Alismaceæ).—This is a genus of greenhouse, hardy, and stove water plants. The first and the last sections are excluded from the present edition as being beyond its scope. The best hardy species are described under ARROW-HEAD in our article on *WATER GARDEN: PLANTS FOR THE*, to which readers are referred.

ST. ANTHONY'S TURNIP (*Ranunculus bulbosus*).—See note at end of *RANUNCULUS.*

ST. BERNARD'S LILY (*Anthericum.* Nat. Ord. Liliaceæ). — Unless we still include St. Bruno's Lily, which used to be put in the same genus as St. Bernard's Lily under Anthericum, there is only one species of sufficient garden utility to be included in this work. The genus consists of tuberous-rooted herbaceous perennials usually bearing white flowers.

Culture.—Any good light soil suits the St. Bernard's Lily. It may be planted any time in October or in the early part of November. A mulching of old rotten manure put over the crowns in December is helpful in keeping the plants in vigorous health.

Varieties:—*Anthericum Liliago.*—This bears small white lily-like flowers from June to August. Its height is 1½ ft.

A. Liliastrum.—This is the old botanical name for ST. BRUNO'S LILY, now *Paradisea Liliastrum*, and is mentioned here on account of its similar appearance to St. Bernard's Lily, as it is frequently found under this name in the older gardening works. It blooms in May and June, but is not so tall. See notes on *ST. BRUNO'S LILY.*

Paradisea Liliastrum major. — This, which resembles the above, frequently grows 5–6 ft. high.

J. J. & E. T. E.

ST. BRUNO'S LILY (*Paradisea Liliastrum*, Syn. *Anthericum Liliastrum.* Nat. Ord. Liliaceæ).—This is a useful bulbous border plant requiring the same culture as *ST. BERNARD'S LILY*, which see. It bears white flowers in the early summer, and averages about 1½ ft. in height. The sub-variety *P. l. major* bears bigger blooms, and averages 5–6 ft. in height.

ST. DABEOC'S HEATH (*Daboëcia polifolia*).—See *HEATHS* and *SHRUBS.*

ST. JOHN'S WORT.—See *HYPERICUM*, and *WATER GARDEN: PLANTS FOR THE*. See also HYPERICUM in *SHRUBS*.

ST. JOSEPH'S LILY (*Lilium candidum*). See *LILIES*.

ST. LUCIE CHERRY (*Prunus Mahaleb*). See *TREES*.

ST. PETER'S CORN (*Triticum monococcum*).—See *TRITICUM*.

SALAD PLANTS.

In addition to the better known kinds of plants used for salads, such as Lettuces and Radishes, the cultivation of which is fully dealt with in separate articles on these crops, most of the plants enumerated below find favour either in a mixed salad or alone, and even though the cultivation of a large quantity of any of them is not desirable, the inclusion of a few at least of these little known kinds in the garden is bound to make it much more interesting, and also add needed variety to the salad bowl no matter what the season of the year.

Brief cultural hints on these are given below.

Capsicum (*Capsicum annuum*. Nat. Ord. Solanaceæ).—Seed should be sown in moderate heat early in March, and as soon as the plants are large enough to bear pricking out, transfer to shallow boxes filled with a light sandy soil, and keep covered with a sheet of glass until new roots are made. When ready for a small pot, give each a pot to itself, moving into others until the 6-inch size is reached. Equal parts good turfy loam and leaf-soil suit them during the early stages, but when transferring to final pots add to this one-third old hotbed manure. A cold frame is better for the plants than a heated house; liquid manure may be given after the fruit is set.

VARIETIES.—The most popular include:—Cayenne, Coral Gem, Elephant Trunk, Large Red, Large Square, Long Yellow, Tomato-Shaped, and Yellow Cherry.

Chervil (*Anthriscus cerefolium*. Nat. Ord. Umbelliferæ).—This is one of the most useful of the little known salad herbs. Seeds may be sown in nicely broken-up and finely raked-down soil, any time from March until August. For the later sowing none but a warm, dry spot should be chosen, and light protection afforded the rows during the most severe part of the winter. Allow about 12–15 ins. between the rows, and bury the seed with not more than half an inch of soil, thinning out the plants to 6 ins. apart each way.

Chicory (*Cichorium Intybus*. Nat. Ord. Compositæ).—This forms a very useful winter salad. Seed may be sown in any fairly good soil, early in May, allowing 12 ins. between the rows and 9 ins. between the plants. In November lift a portion of the crop, and after twisting off the tops, re-plant in boxes or pots fairly close together, afterwards standing them in a warm cellar or house where complete darkness is assured. Keep the soil fairly moist, also syringe overhead occasionally. The tops are ready for use when about 9 ins. high, and after cutting them throw away the old roots; a constant supply of young growth being maintained by the frequent introduction of successive batches.

Chili (*Capsicum baccatum*. Nat. Ord. Solanaceæ).—This is not widely cultivated, and is rarely used as an addition to mixed salad except in a green state.

Seeds of all varieties require to be sown in a heated greenhouse early in March, the seedlings being pricked out, or potted on until the middle of May, after which they will be better planted out in a garden frame, or in a warm border. They need a very rich soil and frequent overhead syringing to keep the foliage free from insect pests.

VARIETIES are very numerous: for these reference must be made to trade lists. A comprehensive collection of these is decidedly interesting and attractive.

Chives (*Allium Schoenoprasum.* Nat. Ord. Liliaceæ).—These are very useful plants, more especially where a mild onion flavour is appreciated in the salad bowl, or even as a substitute for young onions in a raw state. They are of easy cultivation, forming compact growing tufts of narrow green leaves, with small bulbs at the root.

Any ordinary garden soil is suitable for their culture, and although not absolutely essential, division of the clumps every third or fourth year is desirable, Planting may be done in early spring, and the cutting of the tops may commence as soon as these are of sufficient length for the purpose wanted. Being of perennial growth, these tops may be cut away several times during the summer, new leaves appearing in a very short time after cutting.

Corn Salad (*Valerianella olitoria.* Nat. Ord. Valerianaceæ).—By many this is better known as *Lamb's Lettuce*, but it is not largely cultivated in this country where the more popular varieties of ordinary Lettuce give better results, especially during the hottest months of summer.

If a summer crop is desired, seed may be sown from early April onward. Frequent sowings are recommended, since the young plants so quickly run to seed. Sowings made in a warm border from the middle of August until the middle of September usually give the most satisfactory returns.

Select a well-manured piece of ground, and sow in drills 6–8 ins. apart, thinning out the seedlings to about 3–4 ins. asunder, and when these carry leaves of fair size, pull up each alternate plant for early use. Picking should be systematically done as soon as the leaves attain fair size, the constant use of the hoe facilitating growth, and prolonging the life of the bed. A light covering of hay should be placed over beds during the most severe weather. If this is done the latest sown plants will give a crop of nice young leaves early the following spring.

Dandelions (*Taraxacum officinale.* Nat. Ord. Compositæ).—These form a useful addition to our winter salads, and deserve to be more widely cultivated.

To obtain good forcing roots, sow seed of the improved variety early in May, allowing a foot between the rows and not less than 8 ins. between the plants. Summer treatment consists of keeping the ground free from weeds. In October or November a portion of the roots should be taken up and treated exactly as advised above for CHICORY.

Egg Plant (AUBERGINE. *Solanum Melongena* var. *ovigerum.* Nat. Ord. Solanaceæ).—Apart from the interesting appearance of these, many find the fruits valuable in mixed salads.

To obtain plants of good size, seed must be sown in a hotbed or in a heated greenhouse early in March, and when the seedlings are 3 ins. high, carefully lift each with a stick, disturbing the roots as little as possible, and pot into small, well-drained pots, using a light, open compost. Keep the plants in a bed covered with glass until new growth is made, afterwards admitting air freely. At each subsequent potting use a rich soil, making this firm about the roots, and disturbing these as little as possible.

The plants may be fruited in pots, or planted out in a sunny border early in June. If the former is favoured, give manure water at each alternate watering after the fruits are set. Plants in the open border should be mulched with rotten manure immediately the first fruits are set, and all should be kept moderately moist at the root, and during hot weather syringed freely overhead.

Mustard and Cress (*Brassica Sp.* and *Lepidium Sp.* Nat. Ord. Cruciferæ).—The cultivation of this is so well understood by all that only a passing reference need be made to it here.

Seeds germinate much more quickly in the dark than when exposed to full light, and a piece of board or brown paper is far better than fine soil for covering the seed, which last should be pressed firmly into the soil and well watered immediately after sowing.

If wanted for use at the same time as Mustard, Cress should always be sown two days in advance, and if outdoor sowing is attempted, and the seed not covered with wood or brown paper, black cotton must be freely stretched across to keep off sparrows and other birds.

Nasturtium (*Tropaeolum majus* and *minus.* Nat. Ord. Geraniaceæ). —The leaves of the climbing and dwarf Nasturtium are much appreciated by some in salads, or indeed at tea-time, between slices of bread and butter. The young leaves only should be used, since the older ones are too strong, and the plants for these purposes must have copious supplies of water. They are grown in a similar way to other less hardy annuals, outdoor sowings being safely made in May. See the notes on *NASTURTIUM* in the body of this work for further particulars.

Purslane (*Portulaca oleracea*, Nat. Ord. Portulaceæ).—This plant has almost gone out of cultivation as a salad plant, being very rarely found even in our largest gardens. It is of easy cultivation, and in addition to the value of the leaves as salad, they may also be boiled in the same way as spinach.

Sow the seed any time from April till September, scattering this thinly in rows 6 ins. apart, the seedlings being thinned to the same distance asunder when they are a few inches high.

Watercress (*Nasturtium officinale*, Nat. Ord. Cruciferæ). — To grow really good Watercress, a shallow stream of running water is desirable. A bed of very gritty soil should be provided, into which, early in spring, nice strong shoots about 6 ins. long should be freely dibbled. Beds may also be made during the autumn, but, generally speaking, those made in spring are more satisfactory.

Good Watercress may also be grown in deep trenches prepared as advised in the article on *CELERY*. In these the grower may choose between strong shoots or seed, and if the latter course is adopted, and care taken to keep the soil constantly saturated with clear water, good cress should follow throughout the summer and early autumn.

F. R. C.

SALADINGS.—See *KINDS OF CROPS* and *SALAD PLANTS*.

SALADINGS: FERTILISERS FOR.—See *FEEDING PLANTS*.

SALAL (*Gaultheria Shallon*). — See *SHRUBS*.

SAL-AMMONIAC. — See AMMONIUM CHLORIDE in *AMMONIA AND AMMONIUM COMPOUNDS*.

SALIX.—See *TREES.*

SALMON-BERRY (*Rubus nutkanus*).—See *SHRUBS.*

SALPICHLÆNA.—Now included in the genus BLECHNUM, for which see *FERNS AND FERN GARDENING.*

SALPIGLOSSIS (Nat. Ord. Solanaceæ).—This is a genus of beautiful half-hardy annuals available in great variety of colours, pencilled in rich tints of yellow, purple, and brownish-red, as sold in mixtures by seedsmen. They are very free flowering, and fine for cutting purposes, also elegant for pot culture. They thrive best when sown in the autumn and early spring in a gentle hotbed or warm house, and will flower freely in the summer and autumn in the greenhouse or conservatory. They will also bloom freely out of doors in a warm, sunny border if treated like bedding Asters. For indoor culture the soil should be rich, light, sandy loam. Temperature required, 40–50° F.

Greenhouse Species :—*Salpiglossis linearis.*—Yellow and purple. Flowers from July to August. Height, 1 ft.

S. sinuata.—Purple. Flowers in July and August. Height, 1 ft. Its variety *straminea* bears red and white flowers, and grows 2 ft. high.

SALSAFY (*Tragopogon porrifolius.* Nat. Ord. Compositæ).—By many, this is better known as the OYSTER PLANT, and thanks to the prevailing customs now adopted by many of our largest horticultural societies of offering prizes for the lesser known vegetables, the cultivation of this is on the up-grade. This being so it is only reasonable to expect that instead of finding only a few isolated rows in large gardens, the merits of Salsafy as a winter vegetable will be fully recognised by the increasingly large number of middle-class amateurs who, after a fair trial, are not likely to allow the plant to be again absent from their gardens.

Cultivation calls for no special skill; ground which will produce shapely Carrots or Parsnips may be relied upon to give good returns with Salsafy. Like all deep-rooting vegetables it prefers a well-trenched or deeply dug soil, free from fresh or recently-dug-in manure, to a shallow, badly worked site, on which a heavy application of new dung has been used.

Specimens of large size and perfect shape usually follow when this crop succeeds Celery, Peas, or Onions for which ample manure was provided the previous season.

Soils of a very hungry nature should have plenty of leaf-soil added at the time of trenching, or old soot strewn over the soil in liberal quantities at the time of digging, and after the plants are well through the soil.

Seed should not be sown before the first week in May, plants from that sown earlier having a tendency to run to seed. Sow in drills from 1 ft. to 15 ins. apart, distributing the large seed very thinly, and afterwards reducing the grass-like seedlings to 10 ins. apart in the row.

Keep the bed free from weeds all summer, and towards the end of the year carefully lift each root with a fork and store between layers of ashes, or if preferred, the crop may remain in the ground to be dug as required during the winter.

Varieties.—The following two are undoubtedly the best:—Giant French, and Sandwich Island Mammoth.

F. R. C.

SALSIFY.—The same as *SALSAFY*, which see.

SALSOLA (SALTWORT. Nat. Ord. Chenopodiaceæ).—This is a genus of salt-loving hardy annuals of little value, but which thrive in light, sandy soil, especially near the coast. The best species is *S. Kali* with flesh-pink flowers. Its white variety *Tragus* may also be grown. Both flower in July, and average 1–2 ft. in height.

SALT.—The meaning of this chemical term is explained in *CHEMISTRY FOR GARDENERS.*

SALT.—See *SOIL FUMIGATING*, and under SODIUM CHLORIDE in *SODA AND SODIUM COMPOUNDS.* See also *WEED KILLERS.*

SALT TREE.—The genus HALIMODENDRON and *H. argenteum.* See *SHRUBS.*

SALTPETRE. — See POTASSIUM NITRATE in *POTASH AND POTASSIUM COMPOUNDS.* See also NITRATE OF POTASH under NITROGENOUS MANURES in *MANURES.*

SALTWORT.—See *SALSOLA.*

SALVIA (Nat. Ord. Labiatæ).—This genus includes many species of hardy and greenhouse plants, mostly perennials, but some of the greenhouse varieties are best when treated as annuals. Propagation is best effected by seed or by cuttings. The height of the various species averages 1½–6 ft.

Culture.—Sow seed of the GREENHOUSE SPECIES in the early spring in a warm house, and prick out the young plants as soon as large enough to handle. They should not be allowed to become pot-bound, consequently, several changes into larger pots will be necessary till finally accommodated in their flowering quarters, pots of 8-inch diameter being suitable for most of the greenhouse varieties. Cuttings may be taken in spring, and should be kept close in a warm house to ensure quick rooting. For pot culture the compost should be four parts yellow, fibrous loam, one part each of leaf-mould and old manure, with a little silver sand.

USES.—Owing to the brilliancy of their colouring, *S. splendens* and its varieties are extremely decorative for summer bedding, as is also the glorious blue sort *S. patens.* For this purpose they are best raised and treated as half-hardy annuals. The shrubby species are sometimes planted out, but several of them are not very floriferous. For greenhouse decoration both the scarlet and blue types are invaluable. *Salvia officinalis* is the common SAGE, more useful in the kitchen garden than the flower border. Most of the Salvias flower during the late summer and throughout the autumn.

Varieties.—The best for Greenhouse and Bedding purposes are *patens*, *splendens*, *tricolor*, and *tubiflora.*—J. L. G.

SALVIA: Biennial Border Species.—These require the usual treatment for biennials, and may be successfully raised from seeds sown in May or June in a cold frame or outside. The seedlings should be transplanted into nursery beds when they have made a few leaves, and later on planted out permanently in sunny positions. We recommend the following:—

Salvia bicolor.—This bears rather attractive flowers, the upper lip of which is bluish-violet, while the lower one is whitish. It blooms from June onwards, and grows 2–3 ft. high.

S. Columbariae.—This bears lovely bright sky-blue flowers in June, July, and August, and grows 1–2 ft. high.

S. Sclarea (CLARY).—This is a useful herb for the kitchen garden, bearing bluish-white flowers in August, and growing 3–4½ ft. high. (See article on *POTHERBS.*)

Perennial Border Species.—These may be grown in the usual way for hardy perennials, but they are not as attractive as some. They are easily propagated by seed and division at the usual times, and are best planted in March. We recommend the following :—

Salvia argentea.—This sort bears pinkish-white flowers from June onwards, and grows 1 yd. high.

S. glutinosa (JUPITER'S DISTAFF).—This is yellow. It blooms from June to July, and grows about 3 ft. high.

S. grandiflora.—This is an attractive blue June and July blooming species, about half the height of *S. glutinosa.*

S. hians (CASHMERE SAGE).—This is a blue June blooming sort growing about 1 ft. high.

S. nubicola.—This is an attractive yellow sort blooming in September and October. Its height averages about 1 yd.

S. nutans.—This bears violet or violet-purple flowers in June and July on plants 2 ft. high.

S. officinalis. See SAGE in article on *POTHERBS.*

S. pratensis (MEADOW SAGE).—This and its variety *Baumgartenii* bear violet and purplish-blue flowers respectively from May to September, on plants 3–4 ft. high.

S. sylvestris (WOOD SAGE).—This must be carefully distinguished from the WOOD SAGE (*Teucrium Scorodonia*) described in our article on *POTHERBS.* It bears violet-purple flowers from August onwards, and averages about 1½ ft. in height.

S. Verbenaca (VERVAIN SAGE).—This and its variety *rubella* bear violet and purplish-red flowers respectively in August and September, on plants 1½–2 ft. high.

S. verticillata.—This bears pretty blue flowers in July and August, on plants 1 yd. high.

S. virgata.—This violet-blue sort blooms in September, and grows 2–3 ft. high.

UP-TO-DATE SELECTIONS.

Salvia patens Cambridge Blue.—Blue. *S. Scarlet Queen.* — Scarlet. *S. Glory of Stuttgart.* — Scarlet. *S. Zurich Improved.*—Scarlet.

SAMBUCUS.—See *TREES.* See also under ELDER in *MEDICINAL HERBS.*

SAMPHIRE (*Crithmum maritimum.* Nat. Ord. Umbelliferæ).—This is used as a pickling plant, and is quite hardy. It bears white flowers from July to August, and grows about 12 ins. high.

Culture is easy in a light, rich spot which does not get very much sun. Seed may be sown outside in March and April, or roots may be purchased and planted in the first named month. Frequent hoeing and watering are advisable, also gentle feeding with salt or nitrate of soda.

SAND.

There are many kinds of sand which are useful to the gardener. We name a few of the more important below :—

Builders' Yellow Sand. — This is not much use for potting, but very good as a medium for plunging plants in. Freshly potted bulbs may in the autumn be buried under 18 ins. of it to keep them warm and induce them to start growing. Plants can also be stood in a bed of it out of doors, or plunged just up to the rims of their pots in it, but it is not quite so good for this purpose as are fine coke ashes ; it is not gritty enough to stop worms completely from entering the pots. Roots such as beet, carrots, celery, leeks, parsnips, and salsafy can be buried in a good bed of it when they have been dug up in the autumn, and will store with perfect safety thus. The yellow sand is also useful for putting on the garden paths in frosty weather to prevent garden owners from slipping, and possibly breaking their necks.

River Sand is frequently a very fine material. In some cases it is quite rich in plant food. It can be used for digging into stony soils, or, when it is rich silt, for improving light soils. In some places it is impossible to get. If it is almost pure sand it may be used for the same purposes as builders' sand named above.

Road Sand is a material of variable quality. When the roads are made of soft sandstone a dust similar to dry river sand is produced. When they are made of limestone the dust is almost equivalent to ground chalk, and very useful indeed if dug into rich soils which have been heavily manured for years with dung. Probably the richest material is produced in wet winters on granite-stoned roads over which many heavy vehicles pass. As is well known, granite is rich in silicate of lime and potash, and when this is subjected to the action of rain, frost, and snow, the pounding grind of heavy wheels, and the action of the manure dropped by numerous horses, it breaks up into simpler compounds which are much more useful for plant life.

The gardener should buy this material as it is periodically swept or scraped off, allow it to dry, and then use it for digging in. Road sand of any kind can be used very advantageously when trenching a strong heavy clay soil. It has not the irritant and disastrous effect on tubers that coke ashes have (see *ASHES: Their Value in the Garden*). Road sand in summer is often very undesirable material, if not dangerous to health. Diphtheria, consumption, and many other similar germs abound in it, owing to indiscriminate spitting, so the gardener should not get any of the sand then. Road sand cannot be used for potting, nor should it be used for storing roots.

Sea Sand.—This is usually somewhat salty. It is good for working into strong soils for the culture of salt-loving plants, such as asparagus, cabbages, and seakale, or for roots such as beet, carrots, parsnips, and salsafy. But if it has to be used instead of road or river sand for lightening soils it should first be soaked with water. A barrel is used for doing this. The sand is shot in, and water poured over it, stirring constantly. The sand is allowed to settle and the water drawn off. It is advisable then to repeat the process a second time.

Silver Sand is probably by far the most generally useful of all sands for the gardener. It is an essential ingredient of practically every potting soil—essential for seed raising, for cutting striking, and for pricking off seedlings. A good pot of this should always stand on the potting-bench. Some people dip fresh cuttings into the pot of sand prior to inserting them, or shake some of it into the holes for the cuttings. This hastens the formation of roots. Silver sand can also be put in a thin layer over the soil of boxes in which it is desired to sow small delicate seeds of half-hardy and greenhouse annuals, half-hardy perennials, and greenhouse perennials. This induces quick germination.

Silver sand when pure should be white, sharp, and gritty The "fine" silver sand, often adulterated with poisonous materials, should never be used unless the gardener wants to lose his plants.—E. T. E.

See also *SOILS: THEIR ORIGIN AND NATURE.*

SAND CHERRY (*Prunus Besseyi* and *P. pumila*).—See *TREES*.

SAND MYRTLE.—The genus LEIOPHYLLUM. See *SHRUBS*.

SAND PEAR (*Pyrus sinensis*).—See *TREES*.

SAND PINK (*Dianthus arenarius*).—See *DIANTHUS*.

SAND PLUM (*Prunus Watsoni*).—See *TREES*.

SANDSTONE.—See *ROCKWORK*.

SANDWORT.—See *ARENARIA*.

SANDY SOILS : IMPROVING.—See *SOIL IMPROVEMENT*.

SANGUISORBA.—A synonym for *POTERIUM*, which see.

SANICLE.—See *MEDICINAL HERBS* and *SANICULA*.

SANICULA (SANICLE. Nat. Ord. Umbelliferæ). — One species of this genus, *S. europaea*, also known as WOOD SANICLE, with white flower-heads, is sometimes grown in the herbaceous border, though it is hardly worth this attention. (See article on *MEDICINAL HERBS* under SANICLE, for additional notes on the plant.)

SANTA LUCIA FIR (*Abies bracteata*). See *TREES*.

SANTOLINA (LAVENDER COTTON. Nat. Ord. Compositæ).—This is a useful genus of hardy, shrubby perennials, some of the species of which are now included in *ANTHEMIS* (which see) and other genera. It is of very easy culture, succeeding well under ordinary border or rock garden cultivation, and may be propagated by cuttings in September or March. The best time to plant is from November to February.

What to Grow.—Only a few species are of any great importance. Of these we recommend the following :—

Santolina canescens.—Syn. *S. rosmarinifolia*, which see.

S. Chamaecyparissus. — This is probably the most popular sort of all, with its several varieties. All bear yellow flowers from July to August, and average 2 ft. in height.

S. rosmarinifolia (Syn. *S. canescens*).—This is a useful sort bearing yellow flowers in August and September. It grows about 2½ ft. high.

S. viridis.—This bears yellow flowers in July and August, but only grows 1–2 ft. high.

SANVITALIA (Nat. Ord. Compositæ).—The one useful hardy annual species of this genus is a lovely trailing or spreading plant which comes from Mexico. This, *Sanvitalia procumbens* (Syns. *S. acinifolia* and *S. villosa*), rarely exceeds 6–8 ins. in height, and the garden variety known as *Little Gem* is very dwarf. There are double as well as single forms, but all are free-flowering, and the dark-centred, yellow flower-heads, produced from July onwards, make them effective subjects for edgings or for grouping in the rock garden or flower border. They love sunshine, and should be sown in the spring or early autumn, and transplanted to their flowering positions, or they may be raised in March in gentle heat.

SAP WARTS.—See INTUMESCENCES in *DISEASES OF PLANTS*.

SAPONARIA (SOAPWORT. Nat. Ord. Caryophyllaceæ).—This is a very important genus from the practical gardener's point of view, containing as it does a number of annual, perennial border, and rock garden species. It derives its name from the fact that the juice of the COMMON SOAPWORT (*Saponaria officinalis*) will make a lather with water.

Annual Species.—The two hardy annual species described below are worthy of extensive cultivation. They are easily raised from seeds sown in April and September;

the two sowings are desirable for prolonging the flowering period. The autumn sowings flower in spring, and the spring sowings in early summer.

Saponaria calabrica (Syn. *S. multiflora*).—This is of tufted habit, and white or rosy-carmine varieties are obtainable. Both bloom freely throughout the summer, and grow 4 ins. high. They are suitable for the rock garden, for edging, and massing, if thinned to 4 ins. apart each way.

S. Vaccaria (Syns. *S. hispanica*, *S. oxyodonta*, *S. pentagona*, *S. perfoliata*, *S. rubra*, and *S. segetalis*).—This is a useful border plant, and quite valuable for cutting for flower decorations. It has rose-pink flowers, but there is also a white-flowered variety. The seedlings should be thinned to 2 ft. apart each way as the plants grow bushy and often attain nearly 1 yd. in height.

Perennial Border Species.—These are useful border or edging plants, chiefly the latter, of easy culture, succeeding in ordinary light soil in a sunny or lightly shaded site. They may be propagated by seeds sown in a frame in the spring or summer, by cuttings of the young growth pegged into sandy soil in a frame after flowering, or by division of the roots in the autumn or spring. Success may be expected by planting them from October to April. We recommend the following :—

Saponaria Boissieri.—A useful species for edging, with pink flowers onwards from June, and growing 3 ins. high.

S. lutea.—This is another useful edging sort bearing pink flowers in July. It grows 3 ins. high.

S. officinalis (COMMON SOAPWORT).—The double variety of this (*flore pleno*) is better than the single. Both are attractive pink July flowering subjects useful for cutting, and grow about 2 ft. high. They spread rapidly at the root.

S. pulvinaris.—This is a useful edging species bearing rosy-pink flowers freely through the summer. It grows 3 ins. high.

Rock Garden Species.—The three described below make compact growing plants covered with flowers in early summer. They are propagated by seeds sown in gentle heat in March, or by cuttings in a frame in July.

Saponaria caespitosa.—This is of tufted habit, with narrow leaves. Flowers in umbels, rose coloured. Site sunny. Soil gritty. Flowering Period, June to August. Height, 3 ins.

S. ocymoides.—This sort is of trailing habit with branching stems. Flowers rosy-pink. Site, sunny, rocky ledge. Soil gritty. Flowering Period, May to July. Height, 6 ins. There is a white-flowered form of this plant called *alba*.

S. wienmanniana.—This is a dwarf-tufted plant. Flowers pale rosy-purple. Site, sunny ledge. Soil gritty. Flowering Period, June to July. Height, 3 ins.

SAPONARIA LEAF SPOT.—See *DISEASES OF ROCK PLANTS.*

SAPROPHYTES.—See *FUNGOUS DISEASES.*

SARACEN'S CONSOUND (*Senecio sarracenicus*).—See *SENECIO.*

SARCOCHILUS.—See *ORCHIDS.*

SASSAFRAS.—For the best species see *TREES.*

SASSAFRAS TREE.—See the genus SASSAFRAS in *TREES.*

SATIN FLOWER.—See *SISYRINCHIUM.*

SATIN LEAF (*Heuchera hispida*).—See *HEUCHERA.*

SATIN POPPYWORT (*Meconopsis Wallichii*).—See *MECONOPSIS.*

SATUREIA (SAVORY. Nat. Ord. Labiatæ).—The two species of this genus of hardy plants most usually grown are *S. hortensis*, the

SUMMER SAVORY, and *S. montana*, the WINTER SAVORY. (See SAVORY in our article on *POTHERBS*.)

SAUSSUREA (SAW-WORT. Nat. Ord. Compositæ).—Many species of Serratula are now classed in the present genus, but as the cultural requirements of the two are the same, they are given under the better known *SERRATULA*. Both genera are known by the same English name, but as there are many better things neither should be extensively grown.

Of the species in cultivation, *S. alpina*, *S. candicans*, and *S. hypoleuca* bear purple flowers from June to August. The first grows 6 ins. high, the second 1 yd., and the third 1½ ft. *S. Lappa* and *S. Maximowiczii* bear reddish-purple flowers from June to July, and grow about 12 ins. high.

SAVIN (*Juniperus Sabina*). — See *TREES*.

SAVING SEED.—See *SEED SAVING*.

SAVING SEED POTATOES.

Cooking your hare is conditional on catching him, and saving seed potatoes being dependent on growing them, we shall first say a few words about their production.

Experience has demonstrated the value for "seed" purposes of immature or unripe tubers. The admitted value, to English potato growers, of Scottish or Irish seed is primarily attributable to their comparative immaturity, a result of the heavier rainfall, which makes the tubers longer in growth and fuller of sap than are more ripened ones grown in drier districts. But even in the latter districts, we believe that useful seed tubers can be produced by lifting the crop before the haulm has withered.

As to storing, while much can doubtless be said in favour of greening the tubers and boxing them straight away, we have often been struck by the proportion of apparently sound tubers which has subsequently been destroyed by disease, apparently due to air-developed infection. We therefore prefer to keep potatoes, retained for seed purposes, for a month or six weeks in shallow, earth-covered pits. These are formed in the following manner :—

Pile the tubers either directly on the surface or in a very shallow grave in pyramid form about 2 ft. wide,—the length may be indefinite as there is no risk of heating in such shallow pits,—and having built up the tubers, cover them with about 6–8 ins. of the soil as dry as possible from both sides, forming it into a sharp ridge, and making it firm with the shovel. Finally cover all with a good coating of straw—on no account use the old haulms for the purpose—to keep out rain, placing a ridge of soil over the straw to keep it from being blown off by the wind.

Experience leads us to think that the plain earth in immediate contact with the tubers acts as an antiseptic. Potatoes carrying imperceptible disease spores run considerable risk of ultimate loss if exposed to the air, but, in our opinion, they may be saved by the treatment suggested.

Having completed the pit as described, a shallow drain should be made round it to prevent surface water from reaching the tubers. After remaining in these primary pits for a month or six weeks, it is advisable to open them and re-sort the tubers, putting them either into sprouting boxes, into a store, or into more permanent and larger graves well protected from frost. If boxes are used they should be exposed to the light as much as possible to encourage the growth of plump, tough sprouts, but the greatest care should be taken to protect them from frost.

A useful "tip" in the filling of the boxes, if arrangement of the tubers rose-end upwards is required, is to tilt the box against a wall and build each row from the bottom, making the tubers fit tightly.

This prevents the potatoes rolling about, as they do if the filling is done on the flat, and saves both time and trouble. When filling large numbers of boxes it is not absolutely necessary to set the tubers on end; they may be thrown into them two layers deep. We, however, advise setting up the tubers on end whenever possible.—J. F. W.

SAVORY (*Satureia hortensis* and *S. montana*). — See *POTHERBS* and *SATUREIA*.

SAVOY CABBAGE.—See *CABBAGE, SAVOY*.

SAWDUST MANURE. — See *COW MANURE* and *HORSE MANURE*.

SAWFLIES.

There are a large number of small insects that go by the name of Sawflies. For instance, there is the well-known Gooseberry Sawfly, which, when it once gets a start, frequently strips the bushes of leaves in a very short time. We are not treating of them in detail under this heading because they are included in the article on *INSECT PESTS*. By reference to that article readers will obtain all the information they require to combat these pests successfully.

SAW-WORT.—See *SAUSSUREA* and *SERRATULA*.

SAXEGOTHEA.—For the best species see *TREES*.

SAXIFRAGA (ROCKFOIL. Nat. Ord. Saxifragaceæ).—Few plants are of so much importance in the rock garden as the Saxifrages, or Rockfoils. Many are also of high value for the flower border and wall garden. As edgings to the herbaceous border a considerable number are exceedingly useful, especially when growing over stones.

The number of species known to botanists is extremely great, and even those in cultivation are so numerous that it is impossible within the present limits to discuss them fully or to enumerate more than a representative selection. In addition, there are many varieties and hybrids, which are constantly being increased in number. All those mentioned are, with a few exceptions, hardy and easily cultivated, but their requirements vary according to the section to which the plants belong. General cultural details will be found under the respective headings of each section. The most highly appreciated are the encrusted or Silver Saxifrages (*Euaizoonias*); the Tufted Saxifrages (*Kabschias*); and the Mossy Saxifrages (*Dactyloides*). In the garden it is desirable to include representatives of other sections. There are Saxifrages suitable for sunny crevices or moraines; others which flourish in the shade, even when partially shaded by trees; and some, again, which love moisture and are most at home by the margin of a pond or stream.

Their appearance is as varied as their requirements, and a study of the genus will make it evident that the high importance claimed for these flowers is more than justified. It has, indeed, been said with truth that a garden without Saxifrages is "unthinkable." Such a garden lacks many of the most charming alpine flowers, and has about it a want of interest easily supplied by the inclusion of some of the fascinating plants comprised in this genus. The majority of those in cultivation are hardy and perennial, and will give satisfaction if grown according to the directions under the headings of the respective sections. It is only proper to add that the nomenclature of the Saxifrages in nurseries is often extremely unreliable; and that those named here are perennial unless otherwise mentioned.

Saxifrage Sections.—The Saxifrages have been divided by botanists into numerous sections, and these afford valuable assistance in giving an idea of their general appearance and cultural requirements. The most recent grouping has been followed here, and the letters in brackets immediately after the name of each plant refer to the section in which it is included.

BERGENIA SECTION.—Here we have a group of Rockfoils comprising a considerable number of good garden subjects, frequently found in nurseries as *Megaseas*. They have generally large, thick, fleshy leaves and panicles of flowers varying from purple to white. They look well by the sides of streams and in wild gardens, besides being valuable for the border and rockery, and any ordinary soil suits them. *S. ciliata* and *S. Stracheyi* should have a warm place. They are increased by division or seeds in spring or autumn, and are marked (Be) in the list.

BORAPHYLLA SECTION.—The plants in this are of little importance for the garden and may be omitted, unless the owner has a desire for a botanical collection. They have small flowers in panicles and radical leaves. A moist and sunny position is the best. They are increased by division or seeds in spring, and are marked (Bo) in the list.

CYMBALARIA SECTION.—This is a limited group, including one or two species of charming hardy annuals or biennials with small glossy leaves and bright flowers. They bloom for a long season. It is unnecessary to grow more than one species. They generally sow themselves in the garden, and delight in a cool, rather moist position on the rockery, retaining wall, or level ground. Seeds sown in the open in early spring will flower in autumn; if sown in early autumn the plants will flower the following spring. This section is marked (C) in the list.

DACTYLOIDES SECTION.—The Mossy Saxifrages, as they are popularly called, constitute one of the most important groups of the genus. They vary considerably in size and character of foliage. Some make close mounds of moss-like verdure of high beauty. Others form masses of larger leaves, frequently finely cut, and of much charm when examined. The plants cover themselves with flowers, these being generally white or whitish, but there are also some with red or pink flowers, and new varieties of these shades are rapidly increasing in numbers. The Mossy Rockfoils love a cool position, such as the more northerly aspect of the rock garden, and make charming edgings. In hot or dry positions they are liable to become brown in the centres, and very large plants are peculiarly apt to become disfigured in this way. When this happens the plants should be pulled to pieces and replanted. They are of easy culture in any soil, and their propagation is almost absurdly simple. Small pieces set in the soil during the spring, summer, or early autumn months will generally root rapidly. Seedlings are easily raised by the ordinary methods for hardy perennials—either under glass or in the open. They are marked (Da) in the list.

DIPTERA SECTION.—This includes such well-known subjects as *S.*

sarmentosa, the old MOTHER OF THOUSANDS, so often grown in hanging pots and baskets in windows and greenhouses. Few of the plants are absolutely hardy in the whole of the United Kingdom, but *S. Fortunei* is a good Saxifrage for warm rockeries or moraines. The others are best under glass. These plants like a sunny place and rather light soil, not too wet in winter. Increase by offsets or runners, which are easily rooted, or by seeds in some cases. They are marked (Di) in the list.

ENGLERIA SECTION.—The Saxifrages belonging to the ENGLERIA section are of some importance, although not always satisfactory in the garden. They vary in character of foliage. Some grow in large rosettes resembling those of the EUAIZOONIA section; others have close, spiny foliage, like that of the KABSCHIAS. All are remarkable for the smallness of the flower proper and the large, conspicuous calyx, frequently the most ornamental part of the inflorescence. The ENGLERIA Rockfoils generally prefer sun, and look best in chinks of the rock garden. They prefer a light loam, with some lime added, and, though sun-lovers, ought not to be allowed to become too dry at any time. They are raised by seeds, sown in spring or when ripe, and hybridise freely with the Saxifrages of other sections. They are marked (E) in the list.

EUAIZOONIA SECTION.—This comprises the favourite Silver or Encrusted Rockfoils, among the most cherished of garden plants. They produce rosettes of varying size, generally marked along the edges of the leaves with a silvery encrustation, and with the remainder of the foliage of pleasing shades of silver, grey, or green. Some species present the appearance of little mounds of silvery-grey, composed of miniature rosettes, and throwing up short stems bearing panicles of charming flowers. Others, such as *S. Cotyledon* and its varieties, or the queenly *S. longifolia*, produce large braided rosettes of noble appearance and towering spires of flower of fine effect. As these Silver Saxifrages cross freely with each other, it is essential to propagate them by offsets, as seedlings rarely come true to the parent. In the case of *S. longifolia*, which does not produce offsets, it is necessary to save seeds from plants a distance from other species. Seeds can be sown when ripe, and germinate well on moss in the open or in pots or pans under glass. The offsets may be detached any time from early spring till autumn, and root well in sandy soil. Practically all the Rockfoils of this section delight in warm, sunny banks, and prefer a rather gritty soil and lime in some form. Many new hybrid Silver Saxifrages are being raised and put on the market. This section is marked (Eu) in the list.

HIRCULUS SECTION.—In this group we have a few plants of value for moist places in the rock garden, artificial bog, or by the sides of streams or ponds in sun. They have small, entire leaves and yellow flowers. *S. Hirculus major* is the best. They are propagated by division or seeds, and are marked (H) in the list.

ISOMERIA SECTION. — Only one species of this section is known in commerce. This is the plant often called *Boykinia aconitifolia*, which is correctly *Saxifraga aconitifolia*. It is of little account in the garden. The leaves are roundish, and the flowers are white. It is increased by division of the underground rhizomes or seeds. Well-drained soil is required for this, which is marked (I) in the list.

KABSCHIA SECTION.—An invaluable section, of which *S. burseriana* may be named as representative, and one of the most important of the genus. No rock garden can be considered complete without some representatives of these exquisite Rockfoils. They may be briefly described as constituting small mounds of spiny leaves of lovely shades of grey, green, or silver, and bedecked in their season by numerous flowers of the highest order of beauty. The blooms vary in colour, but some fine yellows are included, and few of these Tufted Rockfoils are valueless. Their nomenclature is difficult; and the frequent introduction of new species and varieties renders it impossible to do more than give a selection of the best plants of this section in commerce at the present time. These KABSCHIA Saxifrages usually prefer a light, sunny position, in a soil of loam, leaf-mould, and some sand and grit, with the addition of a modicum of lime. They flourish in the moraine, as well as in the rock garden. Propagation is effected by division or seeds. A little top-dressing with the compost indicated above is desirable in autumn and early spring, working it well among the leaves. They are marked (K) in the list.

MISCOPETALUM SECTION. — A limited section of useful and pretty Rockfoils with small, rather heart-shaped leaves and panicles of pleasing flowers. They are easy to grow, but have a liking for moisture and some shade. Almost any soil will suit, but, if heavy, a little leaf-mould, sand, and grit will be helpful. They are propagated by division or seeds, and are marked (M) in the list.

NEPHROPHYLLUM SECTION.—Only a few plants of this section are in cultivation. The best known, and one which fairly represents the general character of the group, is *Saxifraga granulata*, the MEADOW SAXIFRAGE, the double form of which, *S. granulata fl. pl.*, is often seen in gardens. These plants flourish in an open position and a moist soil, but can be cultivated in ordinary loam in the garden. They are propagated by division, by bulbils and seeds, and are marked (N) in the list.

PELTIPHYLLUM SECTION. — The only species of this in cultivation is *Saxifraga peltata*, a bold plant for the border, wild garden, or the sides of ponds or streams. It has handsome leaves of varying tints at the different seasons, and panicles of pink or white flowers. It delights in moisture, and is increased by division. It will be found marked (Pe) in the list.

PORPHYRION SECTION.—In this section of Rockfoils we have a few species only, but some of the varieties they yield are of extreme charm. They are, however, often shy of flowering in gardens, and, in consequence, are not so much grown. To induce them to flower they ought to have rather a cool position, yet one with a fair amount of sunshine, a poor soil, thoroughly well drained, and plentiful waterings in summer. The writer has found good results follow top-dressing with grit in early spring, working it well in with the fingers and then giving a good watering. These PORPHYRION SAXIFRAGES produce close carpets of small foliage, set with brilliant purplish or red flowers. Our native *S. oppositifolia* may be taken as representative of the group. Propagation is effected by division, and the plants are greatly benefited by pulling them to pieces and replanting every three or four years. They are marked (Po) in the list.

ROBERTSONIA SECTION.—A section comprising a few excellent garden plants. *Saxifraga umbrosa*, the LONDON PRIDE or NONE-SO-PRETTY, is a good representative of the group, although some of the others are more refined in their effect. They do well in almost any soil, and are quite satisfactory under trees or in other shady places where few Rockfoils will thrive. They are increased by division or seeds, and are marked (R) in the list.

TRACHYPHYLLUM SECTION.—Only a small number of Rockfoils belong to this section, and, as a rule, these are not of much importance. The most useful are *S. aizoides*, the STREAMLET SAXIFRAGE, and its variety *aurantiaca*. They have entire leaves and yellow or whitish flowers. They delight in moisture, are propagated by division or seeds, and will be found marked (T) in the list.

We now give a

KEY TO THE SECTIONS, in order that readers, when studying the Selection of Sorts to follow, may be able to see at a glance to which section they belong :—Bergenia (Be); Boraphylla (Bo); Cymbalaria (C); Dactyloides (Da); Diptera (Di); Engleria (E); Euaizoonia (Eu); Hirculus (H); Isomeria (I); Kabschia (K); Miscopetalum (M); Nephrophyllum (N); Peltiphyllum (Pe); Porphyrion (Po); Robertsonia (R); Trachyphyllum (T). The list below is by no means an exhaustive one, as many hundreds of species and varieties are known. It includes, however, all the best and most useful sorts.

SELECTION OF SORTS.

Saxifraga aconitifolia (I).—White flowers in May. Height, 15 ins.

S. aizoides (T).—The STREAMLET SAXIFRAGE, with yellow flowers in June. Height, 4 ins. *S. a. aurantiaca* has orange flowers.

S. Aizoon (Eu).—White or spotted red flowers in May. Height, 8–10 ins. Numerous varieties are available, all similar to the above. A few of the best are :—*altissima, balcana, baldensis, californica, carinthiaca, cultrata, dubia, elongata, flavescens* (yellowish), *incrustata, intacta, la graveana, lutea* (yellow), *Malyi, minima, minor, notata, paradoxa, pectinata, punctatissima, rosea* (red), *sempervivoides, stabiana, thyrsiflora,* and *triternata* (pink).

S. ajugifolia (Da).—White flowers in May. Height, 9 ins.

S. apiculata (K).—Pale yellow flowers in March. Height, 2 ins.

S. Apple Blossom (Da).—Pink flowers in May. Height, 6 ins.

S. aretioides (K).—Yellow flowers in May. Height, 3 ins.

S. Arkwrightii (Da).—Red flowers in May. Height, 6 ins.

S. aspera (T).—Yellowish-white flowers in May. Height, 3 ins.

S. Bakeri (Da).—Red flowers in May. Height, 3 ins.

S. Bertoloni (E).—Rose and yellow flowers in May. Height, 6 ins.

S. biflora (Po).—Red flowers in May. Height, 2 ins.

S. Borisii (K).—Yellow flowers in May. Height, 3 ins.

S. Boydii (K).—Yellow flowers in March. Height, 3 ins. *S. B. alba* is white.

S. burseriana (K).—White flowers in March. Height, 3 ins. The varieties *crenata, Gloria, grandiflora, magna,* and *major* are all white.

S. bursiculata (K).—White flowers in March. Height, 3 ins.

S. caesia (K).—White flowers in May. Height, 3 ins.

S. caespitosa (Da).—White flowers in May. Height, 6 ins.

S. Camposii (Da).—White flowers in May. Height, 6 ins.

S. carniolica (Eu).—Creamy-white flowers in May. Height, 15 ins.

S. cartilaginea (Eu).—White flowers in May. Height, 9 ins.

S. catalaunica (Eu).—White flowers in May. Height, 15 ins.

S. Cherry Trees (K).—Yellow flowers in April. Height, 3 ins.

S. ciliata (Be).—Pink flowers in April. Height, 1 ft.

S. Clibrani (Da).—Red flowers in May. Height, 6 ins.

S. Clusii (Bo).—White and pink flowers from April to May. Height, 6 ins.

S. cochlearis (Eu).—White flowers in June. Height, 1 ft. *S. c. minor* only grows 3 ins. high.

S. cordifolia (Be).—Flowers pink, etc., in May. Height, 1 ft. There are many varieties of this.

S. Cotyledon (Eu).—White flowers in June. Height, 2 ft. Numerous varieties of this are available, including *islandica*, *nepalensis*, *pyrenaica*, etc., all of which are similar to the above.

S. crassifolia (Be).—Pink flowers in May. Height, 1 ft.

S. Craven Gem (Da).—Red flowers in May. Height, 6 ins.

S. crustata (Eu).—White flowers in June. Height, 6 ins.

S. cuneifolia (R).—White flowers in May. Height, 6 ins.

S. cuscutaeformis (Di).—White flowers in June. Trailer.

S. decipiens (Da).—White to red flowers in May. Height, 6 ins.

S. diapensioides (K).—White flowers in April. Height, 2 ins. *S. d. tombeanensis* has white flowers.

S. Dr Ramsay (Eu).—White flowers in June. Height, 1 ft.

S. exarata (Da).—White flowers in May. Height, 9 ins.

S. Faldonside (K).—Yellow flowers from April to May. Height, 3 ins.

S. Fergusoni (Da).—Red flowers in May. Height, 4 ins.

S. flagellaris (T).—Yellow flowers in May. Height, 3 ins.

S. Forsteri (K).—Yellow flowers in May. Height, 3 ins.

S. Fortunei (Di).—White flowers from August to September. Height, 9 ins.

S. geranioides (Da).—White flowers in June. Height, 9 ins.

S. Geum (R).—White and spotted red flowers in May. Height, 9 ins.

S. granulata (N).—The MEADOW SAXIFRAGE, with white flowers in April. Height, 6–10 ins. *S. g. flore pleno* has double white flowers.

S. Grisebachii (E).—Crimson flowers in April. Height, 6 ins.

S. Guildford Seedling (Da).—Red flowers in May. Height, 4 ins.

S. Hirculus (H).—Yellow flowers in August. Height, 4–8 ins. *S. H. major* grows 10 ins. high.

S. Hostii (Eu).—White flowers in June. Height, 15 ins. *S. H. altissima* grows 18 ins. high.

S. hypnoides (Da).—The DOVEDALE MOSS, with white and other coloured flowers in May. Height, 6 ins.

S. Irvingii (K).—Rose flowers in May. Height, 3 ins.

S. kestoniensis (K).—White flowers in April. Height, 3 ins.

S. kolenatiana (Eu).—Pink flowers in June. Height, 18 ins. *S. k. major* grows 2 ft. high.

S. Kotschyi (K).—Yellow flowers in May. Height, 3 ins.

S. Kyrilli (K).—Yellow flowers in May. Height, 3 ins.

S. L. C. Godseff (K).—Yellow flowers in April. Height, 3 ins.

S. ligulata (Be).—Purple flowers in May. Height, 1 ft. There are several varieties of this, including *alba*, which is white.

S. lilacina (K).—Lilac flowers in April. Height, 2 ins.

S. lingulata (Eu).—White flowers in June. Height, 15 ins. There are numerous varieties of this, including *australis*, *Bellardii*, *lantoscana*, etc., which are similar to the above.

S. longifolia (Eu).—White flowers in June. Height, 2 ft.

S. macnabiana (Eu).—White and spotted red flowers in June. Height, 15 ins.

S. marginata (Syn. *S. Boryi*) (K).—White flowers in April. Height, 3 ins.

S. media (E).—Purple flowers in May. Height, 6 ins.

S. Miss Stormonth (Da).—Red flowers in June. Height, 3 ins.

S. muscoides (Da).—White flowers in May. Height, 3 ins. *S. m. atropurpurea* has red flowers.

S. mutata (Eu).—Orange flowers in June. Requires a damp soil. Height, 15 ins.

S. oppositifolia (Po). — Purple flowers from March to April. Height, 1½ ins. *S. o. alba* has white flowers, while *S. o. pyrenaica* and *S. o. superba* have red-purple flowers.

S. paradoxa (Eu). — Yellowish-white flowers in June. Height, 9 ins.

S. Paulinae (K).—Yellow flowers in April. Height, 2 ins.

S. pedatifida (Da).—White flowers in May. Height, 9 ins.

S. peltata (Pe).—The UMBRELLA PLANT, with white or red flowers from April to May. Height, 3–5 ft.

S. Petraschii (K).—White flowers in April. Height, 3 ins.

S. porophylla (E). — Rose and yellow flowers in May. Height, 6 ins.

S. primuloides (R).—Rose to pink flowers in June. Height, 6 ins.

S. Red Admiral (Da).—Red flowers in May. Height, 6 ins.

S. retusa (Po).—Rosy to crimson flowers from June to July. Height, 4 ins.

S. rivularis (N).—White flowers in May. Height, 4 ins.

S. rocheliana (K).—White flowers in March. Height, 3 ins. *S. r. coriophylla* is similar to the above.

S. sancta (K).—Yellow flowers in April. Height, 3 ins.

S. sarmentosa (Di). — Flowers white, yellow etc., from June onwards. Height, 9 ins. *S. s. tricolor* has variegated leaves.

S. scardica (K).—White flowers in May. Height, 3 ins.

S. Sibthorpii (C).—Yellow flowers from May to September. Height, 3 ins.

S. Stracheyi (Be).—Pink flowers in April. Height, 1 ft.

S. Stribrnyi (E).—Purple flowers in May. Height, 6 ins.

S. taygetea (M). — White and spotted scarlet flowers in May. Height, 9 ins.

S. thessalica (E).—Red and yellow flowers in May. Height, 6 ins.

S. trifurcata (Da).—The STAG'S-HORN ROCKFOIL, with white flowers in May. Height, 9 ins.

S. umbrosa (R).—The well-known LONDON PRIDE, with white and pink flowers in June. Height, 9 ins. *S. u. Andrewsii*, and *S. u. serratifolia* are similar to the above.

S. valdensis (K).—White flowers in June. Height, 2 ins.

S. Vandellii (K).—White flowers in June. Height, 2 ins.

S. Wallacei (Da).—White flowers in May. Height, 9 ins.

S. Zimmeteri (Eu).—White flowers in June. Height, 10 ins.—S. A.

NEW VARIETIES.

Saxifraga burseriana sulphurea.—Sulphur-yellow flowers.

S. J. C. Lloyd Edwards.—Rosy-crimson flowers on plants of very dwarf, compact habit.

S. Kewensis rosea.—Pale rose-white flowers and purplish-red stems.

S. Mrs R. J. Wickham.—Large pale rose flowers, veined crimson, on plants 6–9 ins. high.

S. oppositifolia R. M. Pritchard.—Large rosy-purple flowers.

S. Sundermanni.—White flowers on short stems, in dense rosettes.—W. J. C.

SAXIFRAGA RUST.—See *DISEASE OF ROCK PLANTS.*

SAXIFRAGE SECTIONS.—See *SAXIFRAGA.*

SAXIFRAGES FOR WALL GARDENS. See *WALL GARDENING.*

SCABIOSA.—See *SCABIOUS.*

SCABIOUS (*Scabiosa.* Nat. Ord. Dipsaceæ).—For cutting or for border decoration the annual Scabious are particularly useful, as the rounded, pin-cushion-like heads of bloom last a long time, and are carried on long, wiry stems. The best results follow half-hardy treatment, but autumn flowering can be obtained by sowing out of doors in April. Planted in groups, each plant 15 ins. from its neighbour, a fine effect is produced if the better strains are grown and lightly supported with slender sticks. Of the several annual species only one is of real garden value, namely :—

Scabiosa atropurpurea.—An old garden plant, and formerly known as *Asterocephalus*, and *Pterocephalus atropurpureus.* Seeds of distinct colour forms are obtainable, and the range is from white, through pink, salmon, rose, lilac, blue, purple, and yellow to scarlet, crimson, and blackish-maroon. It flowers freely through the summer, and grows 2–3 ft. high. A fuller description of it will be found in our article *SWEET SCABIOUS*, which see.

Perennial Border Species.—A very large number of these have been described, and long lists are frequently inserted in other gardening dictionaries. The following selection, however, contains, in our opinion, the cream of the sorts, many of which are valuable for cutting, and all of which may be grown with little difficulty in ordinary rich garden soil in a sunny or very lightly shaded position. They are easily increased by seeds sown in the usual way for perennials, or by division of the roots in November or March, which last is the best time to plant.

Scabiosa australis.— This is a purple midsummer flowering sort growing 1½ ft. high.

S. caucasica (Syns. *S. connata* and *S. elegans*).—This is probably the most popular of all the Scabious. Its flowers, of the extremest pale blue, are produced with remarkable freedom from June to August on plants 1–2½ ft. high. The many so-called varieties of this offered by the nursery trade are not recognised at Kew.

S. connata.—Syn. *S. caucasica* above.

S. elegans.—Syn. *S. caucasica* above.

S. graminifolia.—This, described under the Rock Garden Species, is useful too, near the front of borders.

S. japonica (of the trade).—This is no longer a recognised variety.

S. lucida.—This is a pretty blue species flowering freely during the summer months, and growing about 2 ft. high.

S. ochroleuca.—This is a useful yellow midsummer and late summer flowering sort about 1½ ft. high.

S. speciosa.—This is an attractive blue summer flowering Scabious of the average height.

S. Succisa (DEVIL'S-BIT SCABIOUS).—This sort bears blue flowers in June and July, and averages 1½ ft. high.

S. sylvatica.—This useful sort bears white flowers about midsummer on plants 1½ ft. high.

Rock Garden Species.—The two species described below make excellent rock garden plants. They will both thrive in sunny positions in well-drained, loamy soil, and are propagated by division of the roots in autumn and spring.

Scabiosa graminifolia.—This forms a woody rootstock, with tufts of narrow, silvery leaves. Flowers pale mauve. Flowering Period, June to September. Height, 1 ft.

S. Pterocephala (Syn. *Pterocephalus Parnassi*).—This forms mound-like tufts of grey-green foliage. Flowers pale purple. Flowering Period, June to September. Height, 6 ins.

SCALDING SOIL.—See *Soil Sterilisation.*

SCANDIX (Shepherd's Needle. Nat. Ord. Umbelliferæ).—This is an uninteresting genus of weedy plants sometimes offered to unwary amateurs. *S. Pecten-Veneris* is the best known species. It is the Common Shepherd's Needle, a troublesome weed in some districts.

SCAPTOMYZA.—See Turnip Leaf Miner in *Insect Pests.*

SCARBOROUGH LILY (*Vallota purpurea.* Nat. Ord. Amaryllidaceæ).—This is a well-known and popular plant, not only on account of the bright scarlet blooms which it throws up in August and September, and which are most effective either when growing for conservatory decoration, or when cut for vases; but also because it is an uncommonly good window-plant. Some excellent examples are annually to be seen in cottages and small houses where there is no glass accommodation whatever. It is only half-hardy.

Culture.—The bulbs are not very particular as to soil. For preference this should be fairly stiff loam with a little sand and leaf-mould, and when potting the bulbs should not quite be covered with soil, though firm potting is essential. As repotting is only advisable once in four years, the plants must be fed when they are in active growth. This can be seen by the pushing up of new leaves. The Scarborough Lily has naturally evergreen foliage, so the plants must not be "dried off," and care must be taken to retain healthy foliage all the year round. A winter temperature of 40–50° F. should be maintained, and during this period very little water will be required. As small offsets are made, they may be carefully removed and grown on in other pots till large enough to flower.

Varieties.—All the forms offered are very similar to the typical old, scarlet *Vallota purpurea.* They are probably seminal varieties.

Vallota purpurea eximia has a white throat. It is even more beautiful than the old form, especially if the segments are wide and open.

V. p. major has larger flowers than the type.

V. p. minor is a small-flowered sort.

All the varieties of Scarborough Lily flower in late August or September. Their leaves in well-grown examples average 12–15 ins. in length, and the flower stems 18–24 ins. in height.—J. J. & E. T. E.

SCARLET BARK WILLOW (*Salix alba caerulea*).—See *Trees.*

SCARLET CLEMATIS (*Clematis coccinea*).—See *Climbing and Trailing Plants.*

SCARLET FLY-CAP.—See Harmful Fungi in *Fungi: Edible and Harmful.*

SCARLET GOURD. — See *Ornamental Gourds.*

SCARLET HAW (*Crataegus coccinea*). See *Trees.*

SCARLET HOLLY (*Desfontainea spinosa*). — See *Climbing and Trailing Plants.*

SCARLET OAK (*Quercus coccinea*).—See *Trees.*

SCARLET PIMPERNEL.—See *Weeds.*

SCARLET POPPY (*Papaver Rhoeas*). See *Poppies.*

SCARLET RUNNER, or RUNNER BEANS.—See *BEANS* and *PHASEOLUS*. See also *ORNAMENTAL VEGETABLES*.

SCARLET TURK'S CAP LILY (*Lilium chalcedonicum*).—See *LILIES*.

SCENERY IN GARDENING. — See *LANDSCAPE GARDENING*.

SCHELLOLEPIS.—Now included in the genus POLYPODIUM, for which see *FERNS AND FERN GARDENING*.

SCHIVERECKIA.—Now included in the genus *ALYSSUM*.

SCHIZANTHES.—Now included in the genus *NARCISSUS*.

SCHIZANTHUS (BUTTERFLY FLOWER. Nat. Ord. Solanaceæ).—This is a genus of very decorative half-hardy annuals, thriving in rich, free soil, and propagated by seed. The height averages 1½–4 ft.

Culture.—Seed is best sown in August or September for spring display, and in March for summer and autumn flowering. Autumn sown plants should be kept cool and rather dry during winter, a temperature of 45° F. being sufficient. By the judicious pinching of the leader first, and subsequently of the lateral growths, bushy and sturdy plants will be formed, which, later, will be a mass of bloom from top to bottom. Spring sown seedlings are treated in the ordinary way for half-hardy annuals.

USES.—For conservatory decoration no plant surpasses this for wealth of bloom. The species *S. pinnatus* and *S. retusus* are suitable for bedding out of doors, but only a rich, free soil should be used.

Varieties. — The best sort is *S. Wisetonensis*, a particularly fine strain known as *Dr Badger's Hybrids* being procurable from seed specialists. Other useful species are as mentioned above, *S. pinnatus* and *S. retusus*.—J. L. G.

NEW VARIETY.

Schizanthus Wisetonensis Snowflake.—This is pure white except for the anthers. It is of dwarf habit, and very floriferous.

SCHIZOCODON (JAPANESE MOONWORT. Nat.Ord.Diapensiaceæ).—There is only one species in this genus, which is closely allied to the genus *SHORTIA*. This, *Schizocodon soldanelloides*, is a shade-loving plant, and requires well-drained, sandy loam and peat in a sheltered situation, preferably in the rock garden. It is not easy to increase, but may be propagated by careful division in spring. It bears tufts of evergreen leaves, tinted crimson in autumn, and bright rose-fringed flowers from April to June. Its height is 4 ins.

NEW VARIETY.

Schizocodon ilicifolia.—This is a white-fringed, dwarf-growing evergreen subject, suitable for a shady part of the rock garden.

SCHIZONEURA.—See WOOLLY APHIS in *INSECT PESTS*.

SCHIZOPETALON (Nat. Ord. Cruciferæ).—Lovers of fragrant hardy annuals should include the Chilian species of this little known genus (*Schizopetalon Walkeri*) in their gardens. It has white flowers that give forth a very sweet odour in early morning, during evening, or after a light rain. It succeeds in any good garden soil, and sowings should be made at intervals from early spring onward to secure a continuance of flowers and fragrance. It may also be raised from seed as a half-hardy annual and planted out in the borders after being duly hardened off. The height when in bloom rarely exceeds 1 ft.

SCHIZOPHRAGMA.—For the best species see *CLIMBING AND TRAILING PLANTS*.

SCHIZOSTYLIS.—See *KAFFIR LILY.*

SCHOENUS.—See *BOG RUSH.*

SCHOMBURGKIA.—See *ORCHIDS.*

SCHOOL GARDENING.

The question of school gardening is no longer such a vexed one as it used to be. Most parents realise the great advantages resulting from their young people learning gardening while they are young, though there are still, alas, a fair number of parents who do not like their children (especially their daughters), to soil their hands by direct contact with Mother Earth.

Though many primary and secondary schools have their gardens, there are hundreds of small semi-private schools where gardening has not yet been started. The bigger public schools for both boys and girls have during the years of War often opened their eyes for the first time to the profitable nature of gardening, but many girls' private boarding schools have done nothing whatever, and will continue to do nothing whatever, in this direction unless some one can persuade them to the contrary.

Even with no grant from the Board of Education, school gardening can be made profitable. Girls of 12–18 can dig very creditably provided they are taught how, and do not overtax themselves by attempting to do too large an area at a time. A quarter of an acre properly cultivated will provide enough food in the way of green and second vegetables to keep the 30–40 scholars during the whole of term time, and if very heavy cropping potatoes are grown and treated well as regards manure they should be able to keep themselves in this crop also with but little extra ground.

As with everything else, the utmost care must be taken that all the children who work at School Gardening start right from the very first. If they begin by holding their tools wrong, by planting loosely, or by doing any of the hundred and one things they may do in an incorrect manner, it will be very difficult to break them of the habit. Constant supervision is essential to success, and the teachers must be able to *show* the pupils exactly how things should be done.

In the article on *SCHOOL GARDENS* which follows, our contributor deals with some of the many practical points connected with this all-important subject.—EDITOR.

SCHOOL GARDENS.

The first question for the Head Teacher of a school to consider when arranging for a School Garden is the *number of children* who would be allowed by the Board of Education to receive instruction. Information on this point is found in articles 3 to 41, Schedule III. (A), of the Board's Code. An important point to remember is, that there must be "one Teacher to every 14 scholars present at one time," but generally all courses are two-year courses of instruction with separate plots, worked by a first and second year scholar together, and such classes may consist of "20 under one Teacher," provided *the consent of the Board has been obtained beforehand.* As the gardening year commences in November each year, this consent should be obtained in October, for failure to comply with this regulation may result in the loss of the grant.

Age of Children.—The children who may be registered for attendance in School Gardening must be eleven years of age at the date of the first lesson they attend, though in special circumstances boys of ten or over may be included. The Board will not sanction the inclusion on the register of boys under ten, or girls under eleven years of age.

Attendance at instruction in gardening, which is usually two hours per week, may not be marked in the Gardening Register excepting where the scholars do practical work "outside" on the plots, or "inside" with budding, grafting, seed testing, and such like. The Board of Education have ruled that theoretical lessons on gardening may not be counted. For registration purposes the whole twenty of the scholars should be marked on *one* register, and grant claimed on the best fourteen.

Arrangement of Garden.—This is the second point to consider. For twenty scholars a piece of ground is required in size about a quarter of an acre. This should be divided into fifteen plots about 2½ perches each. The ideal arrangement is shown in the diagram (Fig. 1).

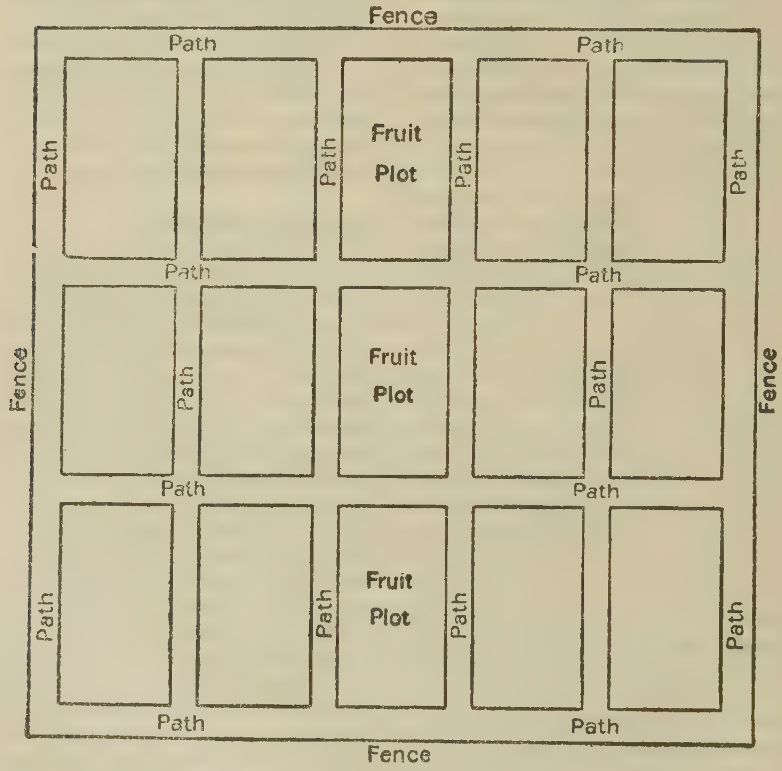

Fence
Path
Path
Path
Path
Fruit
Plot
Path
Path
Path
Path
Path
Fence
Path
Fruit
Plot
Path
Fence
Path
Path
Path
Path
Fruit
Plot
Path
Path
Path
Path
Fence

FIG. 1.—Plan of School Garden.

The plots should be rectangular, about 12 yds. by 6 yds., the paths being about 2 ft. wide.

The centre plots would be permanently used for fruit trees, where all the scholars could receive instruction and practise grafting, budding, etc.

One plot would be used as a seed plot to raise the various plants required for the other plots, and one plot for a model plot for demonstration purposes. The seed plot and the model plot should be changed each year.

If possible arrange the plots in a rectangle, so that the rows of the crops run north and south. The advantage of arranging each plot with the length twice its breadth is to enable the scholars to grow one row of each kind of vegetables.

The whole garden should be fenced in with strong posts and strong wire running *through* the posts, and not nailed to them. Where, in many country districts, rabbits damage the crops, there should be further protection by wire netting 1 yd. high all round the fence, and sunk not less than 12 ins. deep. The plots if arranged in the above manner require only three "lines" when planting, as one line will stretch right across three plots. When one is standing outside the whole plot he can see all of the same kind of vegetables at one glance. A perfect rotation of crops is ensured, and the teacher is enabled to supervise easily the work being done.

What to Grow.—This is our third point. All kinds of vegetables should be grown on each plot, and it is advisable for teacher and scholars to prepare a diagram showing what is grown one year, and another diagram showing the next year's crop. This ensures that the same kind of crop will not be grown two years in succession on the same ground.

Vegetables such as Broccoli, Cauliflowers, Leeks, and Winter Greens will take the places of those crops that mature early.

Herbs such as sage, thyme, mint, etc., can be easily grown round the fruit plots, and marrows may be grown either round the fencing or allowed to run on the fruit plots.

The diagram (Fig. 2) shows crops on plots during the first and second seasons.

FIRST YEAR.	SECOND YEAR.
Shallots.	Runner Beans.
Lettuce.	Shallots.
Early Potatoes.	Lettuce.
Late Potatoes.	Early Potatoes.
Dwarf Beans.	Late Potatoes.
Carrots.	Dwarf Beans.
Peas.	Carrots.
Parsnips.	Peas.
Broad Beans.	Parsnips.
Onions.	Broad Beans.
Cabbage.	Onions.
Beet.	Cabbage.
Turnips.	Beet.
Runner Beans.	Turnips.

FIG. 2.—Crops for School Garden.

The third year and successive years will follow on the same plan.

Amount of Seed Required.—For such a school garden as outlined above, the following quantities will be found sufficient per season: Beans (Broad), 1 qt.; Beans (Dwarf), 1 pt.; Beans (Runner), 1 pt.; Beet, 2½ oz.; Broccoli, ½ oz.; Brussels Sprouts, ¼ oz.; Cabbage, ½ oz.; Carrot, 1¼ oz.; Cauliflower, ½ oz.; Celery, ¼ oz.; Cucumber, one packet of 20 seeds; Leek, ½ oz.; Marrow, two packets of 20 seeds each; Onions (Autumn), ½ oz.; Onions (Spring), 2 oz.; Parsnip, 1½ oz.; Peas, three pints; Potatoes (early), 2 pecks; Potatoes (late), 2 pecks; Tomato, one packet of 100 seeds; Turnip, 1½ oz.

Enough Runner and Dwarf Beans

and Potato Seed should be saved so that new stock is required only once in two years.

Manure Required. — Four loads of farmyard manure, together with 3 lb. of Sulphate of Ammonia, or 3 lb. Nitrate of Soda (according to whether the soil is heavy or light), and 14 lb. of Basic Slag or Superphosphate, will be needed per season. Potash manures being difficult to obtain, ashes from burnt hedge clippings and wood should be used instead. The use of these manures is described elsewhere in this work.

The Tool Shed. — This is a necessity for every School Garden. There must be pegs (wooden) all round the inside of the shed. These pegs and the tools must be small and numbered, so that each scholar always uses the same tools, and thus order and cleanliness are ensured.

Each scholar should be provided with a set of tools consisting of a spade, fork, Dutch hoe, swan-necked hoe, and a rake. In addition there should be for general use three "lines," ½ doz. small handforks, ½ doz. garden trowels, ½ doz. dibbers made in the Manual Training Centre attached to the school, also a rain gauge, and a ground thermometer.

Note Taking.—Each scholar must be provided with a *notebook* and a *diary*. In the former he records his work on the plot, his observations such as the length of time the seed took to germinate, the presence of fly, grub, etc., the poor or excellent state of his crops, his methods adopted, the date of lifting the crop, the use of artificial manures, etc. In the diary, which is written during composition lessons, he will carefully put down the main points from his notebook, what he did, how, and why he did it. His notes will show the effect of the weather (rain, drought, frost, etc.) on his crops. It will be found that each scholar can fill two pages of an ordinary exercise-book in his diary each week. The latter pages of the diary should be ruled, a page for each month showing at 9 a.m. each day degrees registered by ground thermometer, thermometer showing temperature in air; direction and force of wind, also amount of rainfall, and weather forecast. The last page of the diary should be ruled to show a balance sheet, to include cost of seeds, etc., value of produce grown, so that it can easily be seen whether the year's working has been a profitable one or not.

Disposal of Produce.—A word must be said on this important matter. The greater part of the produce is usually sent to the cookery centres attached to the schools, who are thus able to supply dinners very cheaply; even during the War, dinners could be supplied for five days in each week at a cost of a shilling each child per week, because of the free garden produce received from the school gardens.

The remainder of the produce may well be given to the children from their own plot, who take it home and proudly exhibit to their parents what they have grown. The fruit trees (apple, pear, plum, etc.), which the children have grafted, are sold to them very cheaply. The effect in the children who work on the gardens is a very wholesome one; it encourages good work, produces the right kind of emulation amongst them, and trains them to see and act for themselves. All the other lessons in school are helped considerably by school gardening, and instead of looking upon it as an extra subject which may be lightly put aside, it relieves considerably the drudgery of many other lessons.—W. By.

SCIADOPITYS.—For the best species see *TREES.*

SCILLA (SQUILL, or WOOD HYACINTH. Nat. Ord. Liliaceæ).—The Scillas are for the most part hardy bulbous plants, which flower in the spring or early summer. The best known plants are the Blue Squills and the Wood Hyacinths.

Culture.—Any good garden soil suits the majority of the species. The Wood Hyacinths, of which there are two forms—the English and the Spanish—are excellent for naturalising in thin woodlands. They should be planted in October. It is well to clear away the roots and weeds from the patches where they are to be put, and to add some rich, light soil to give the bulbs a start when rooting. Treated in the same way as tulips, they may be grown in pots, placing each bulb ½ in. below the top of the soil; they do not then need "plunging." The Blue Squills should be planted in September and October in any good garden soil. They make good edgings to beds. The Peruvian Squill is only half-hardy except in favoured places in the British Isles. On account of the size of the flower heads, each bulb should be put into a 4-inch pot by itself. The winter temperature must not be above 50° F., as they resent much heat.

Species and Varieties. — The best species are briefly described below :—

Scilla amoena[1] (STAR HYACINTH).—This bears blue flowers in March, on plants 3 ins. high.

S. amoenula.—Syn. *S. sibirica*, which see.

S. bifolia.—This bears pretty blue flowers in early March. There are other colours of this variety, but they are very scarce. Height, 6 ins.

S. campanulata.—Syn. *S. hispanica*, which see.

S. elongata.—Syn. *S. peruviana*, which see.

S. festalis (Syns. *S. nonscripta* and *S. nutans*).—This is the ENGLISH WOOD HYACINTH or BLUEBELL blooming in April, of which we are all so fond. Pink and white varieties can be had as well as the normal blue. Height, 1–1½ ft.

S. hispanica (Syn. *S. campanulata*).—This, the SPANISH SQUILL, is larger than *S. festalis.* Its bells are set all round the spike, which stands upright. The flowers are blue, white, and pink, and are produced in April. Good colour forms are *alba* (white); *Blue Queen* (large pale blue); *Rosalind* (rose-pink); and *Rose Queen* (pale lilac-rose). All average 18 ins. in height.

S. italica.—This bears charming blue flowers in May, and grows about 9 ins. high.

S. Lilio-hyacinthus.—This is a pretty blue species flowering in May and June. It grows about 12 ins. high.

S. nonscripta and *S. nutans.*—Syn. *S. festalis*, which see.

S. peruviana (Syn. *S. elongata*).—Notwithstanding its English name, PERUVIAN SQUILL, this species comes from Algeria. Its flowers, which are produced in May, are pale blue and densely set on a dwarf spike about 8–10 ins. high, forming a flattened cone. The plant is only half-hardy.

S. sibirica (Syn. *S. amoenula*).—This is the well-known BLUE SQUILL, producing dark blue flowers in March. The sub-variety *alba* is decidedly good, the colour being pure white. Height, 4–6 ins.

---

[1] We describe here the plant named by Linnæus. One of exactly similar name is synonymous with *S. messeniaca*, a plant of insufficient beauty to include.—EDITOR.

S. verna (Syn. *S. umbellata*).—This, the SEA ONION, is available in rose-pink, pure white, and sky-blue. It flowers from April to May, and grows about 3 ins. high.—
J. J. & E. T. E.

SCIRPUS (CLUB RUSH. Nat. Ord. Cyperaceæ).—This is a genus of hardy marsh or aquatic plants of the easiest culture, but of small value. The best known species is *S. lacustris*, the common BULRUSH, of which there are several forms, mostly troublesome weeds in ponds, rivers, and lakes. *S. sylvaticus* is not so coarse, growing only about 1 yd. in height. Unless the water garden is very extensive this genus may be dispensed with.

SCISSORS.—See *GARDEN TOOLS*.

SCLAREA.—Now included in the genus *SALVIA*.

SCLEROTINIA DISEASES.—See *DISEASES OF PLANTS*.

SCOLOPENDRIUM.—For the best species and varieties see *FERNS AND FERN GARDENING*.

SCOLYMUS (GOLDEN THISTLE. Nat. Ord. Compositæ).—This is a small genus containing two hardy herbaceous perennials and one hardy annual species—the last named need not be described here. *S. grandiflorus* bears large yellow flowers in May, and grows about 1 yd. high. Referring to the other hardy perennial species (*S. hispanicus*), which bears yellow flowers in August and also grows 1 yd. high, Paxton says that its roots are usually as good as Scorzonera (see article on *SCORZONERA*), and that the leaves and stalks are eaten as Cardoons by the people of Salamanca (see article on *CARDOONS*). The same authority refers to the fact that the flowers are used for adulterating Saffron (see article on *MEDICINAL HERBS*). The two species described above will thrive in ordinary garden loam in a sunny position, and may be propagated in the spring by division of the roots, at which time they may be successfully planted, or by seeds sown outside in the early summer.

SCOLYTUS. — See FRUIT BARK BEETLES in *INSECT PESTS*.

SCORODONIA.—Now included in the genus *TEUCRIUM*.

SCORODOSMA.—Now included in the genus *FERULA*.

SCORPION SENNA.—The genus CORONILLA. See *SHRUBS*.

SCORZONERA (*Scorzonera hispanica*. Nat. Ord. Compositæ).—This is perhaps the most neglected vegetable finding a place in seed lists to-day, a fact much to be deplored, seeing its season of usefulness is during the dull winter months when fresh vegetables are none too plentiful and during very severe weather practically unobtainable. In such times as these, the grower, who the previous summer gave proper attention to his rows of this, has something to be thankful for. True, the taste for this is an acquired one, and very few are favourably impressed with the first dish presented to them, but in reality our inherent conservatism and prejudice against anything new in the way of vegetables account very largely for the unpopularity of this crop among growers and consumers alike. Perhaps now the true value of home-grown vegetables is more fully appreciated, Scorzonera will share with other little-known vegetables wider recognition of its undoubted value.

Culture.—The soil for this crop needs to be very deeply worked, it being sheer waste of seed to sow in shallow soil, or ground simply dug over in the usual way. No manure of any kind need be added; in fact, fresh stable manure if dug into the soil invariably results in worthless roots. The aim is to secure one single root from each plant, and this as straight as possible.

Seed may be sown in April. Sow only in shallow drills, not less than 15 ins. apart. When well through the soil, thin out the seedlings to 9 ins. or 1 ft. apart. Keep the bed free from weeds, but do not attempt artificial watering.

In November the roots may be dug up and stored between layers of dry earth, or, better still, allowed to remain in the bed to be dug as required. Strictly, this crop is biennial, and extra large roots result if two years are allowed for growth.

Variety.—The *Giant Russian* is the best sort to grow.—F. R. C.

See also *VIPER'S GRASS*.

SCOTCH ASPHODEL (*Tofieldia palustris*).—See *FALSE ASPHODEL*.

SCOTCH ELM (*Ulmus montana*).—See *TREES*.

SCOTCH HEATH (*Erica cinerea*).—See *HEATHS*.

SCOTCH KALE.—See DWARF SCOTCH KALE in *BORECOLE, or KALE*.

SCOTCH LABURNUM (*Laburnum alpinum*).—See *TREES*.

SCOTCH LOVAGE (*Ligusticum scoticum*).—See *LIGUSTICUM*.

SCOTCH MAPLE (*Acer dasycarpum*).—See *TREES*.

SCOTCH PINE (*Pinus sylvestris*).—See *TREES*.

SCOTCH ROSE (*Rosa spinosissima*).—See *ROSE SPECIES*.

SCOTCH THISTLE (*Onopordon Acanthium*).—See *ONOPORDON*.

SCOTCH or WYCH ELM (*Ulmus montana*).—See *TREES*.

SCROPHULARIA.—See *FIGWORT*.

SCRUB OAK (*Quercus Catesbaei* and *Q. undulata*).—See *TREES*.

SCUTELLARIA (SKULL CAP. Nat. Ord. Labiatæ).—This is a large genus of hardy herbaceous perennials, half-hardy greenhouse, or stove plants. It is only the former class we need trouble with here, of which the species require ordinary culture such as is bestowed upon other hardy perennials. Some are weedy plants of no garden value, but enemies to increased food production. All are easily propagated by sowing seeds in the usual way in the summer, or by root division in the autumn or spring, at which times they may be successfully planted.

Perennial Species.—We briefly describe below some of the more important:—

Scutellaria alpina.—This and its variety *versicolor* may be used for the rougher portions of the rock garden. Both bear purple flowers in August, and grow 6 ins. high.

S. altissima.—This is a sort bearing very deep purple flowers from July to August, and growing about 12 ins. high.

S. galericulata. — This is the COMMON SKULL-CAP, a useful weed fully described under SKULLCAP in our article on *MEDICINAL HERBS*.

S. minor.—This is a pretty pink species flowering in July, and growing 6 ins. high.

S. peregrina (Syn. *S. Sibthorpii*).—This is a tall-growing sort bearing violet-purple flowers from July to August, and growing about 1½ ft. in height.

SCUTICARIA.—See *ORCHIDS*.

SEA ARROW-GRASS (*Triglochin maritimum*).—See *ARROW-GRASS*.

SEA BUCKTHORN.—The genus HIPPOPHAE. See *SHRUBS*.

SEA HOLLY (*Eryngium maritimum* and the genus ERYNGIUM).—See *ERYNGIUM*.

SEA LAVENDER (*Statice.* Nat. Ord. Plumbaginaceæ).—A very large number of Sea Lavenders have been described, though some of them are rather weedy. Those we mention below are useful for the front portions of the herbaceous or rock border, and also for the rock garden. They are easy plants to cultivate if we neglect the evergreen greenhouse and half-hardy perennial forms, and are easily propagated by seeds sown at the usual time for perennials, or by division of the roots in the autumn or spring. They require common light garden loam and may be successfully planted from November to March. Weeding out undesirables, we recommend the following:—

Statice alpina.—This is now considered synonymous with *Armeria alpina*, which see.

S. Ararati.—This has now been re-named *Acantholimon glumaceum*, which see.

S. auriculaefolia.—This is a pretty dwarf blue sort flowering in July and August. It only grows 6 ins. high.

S. eximia.—Two forms of this are offered. One has white flowers and the other pale rosy-purple or lilac. Both bloom in August, and average 12–18 ins. high.

S. Gmelini.—This bears flowers of the deepest blue in July and August, on plants 12–24 ins. high.

S. incana.—This is an attractive sort with deep pink or even reddish flowers. It blooms in July and August, and only grows 12 ins. high.

S. latifolia.—This is the most favourite sort of all, with its enormous crop of blue flowers and delightful foliage. Its flowering period extends from May to August, and its height averages 12–24 ins.

S. Limonium. — This and its variety *Smithii* bear attractive blue and rosy-violet flowers respectively. They bloom from July to September, and average 12–24 ins. in height.

S. sinuata.—This is quite hardy in warm localities, and is a useful sort bearing purple and yellow flowers in August, and growing 12 ins. high.

S. Smithii.—This nurserymen's sort is not a species. It is the variety *Smithii* of *S. Limonium*, described above.

S. speciosa.—This is quite hardy in warm localities, and its white flowers borne in July and August, on plants 12–18 ins. high, are distinctly useful.

S. Suworowi.—This is a useful rose-pink sort blooming from June to September, and growing about 18 ins. high.

SEA MATWEED (*Ammophila arundinacea*).—See *AMMOPHILA*.

SEA ONION (*Scilla verna*). — See *SCILLA*.

SEA PINK.—See *ARMERIA*.

SEA ROCKET (*Cakile maritima.* Nat. Ord. Cruciferæ).—This is a hardy annual of very easy culture, but not so beautiful as common *ROCKET*, which see. It bears purple flowers in June or July, and grows 9 ins. high. The best time to sow it is early April.

SEA SAND.—See *SAND*.

SEA SPEAR GRASS (*Glyceria maritima*).—See *GLYCERIA*.

SEA SPLEENWORT (*Asplenium marinum*).—See *FERNS AND FERN GARDENING*.

SEAFORTHIA.—See under ARCHONTOPHŒNIX in *PALMS*.

SEAGULL MANURE.—See *POULTR MANURE*.

SEAKALE (*Crambe maritima.* Nat. Ord. Cruciferæ).—The cultivation of this delicious vegetable under glass is dealt with elsewhere in this book; this article deals only with the outdoor treatment of the crop preparatory to lifting for forcing purposes. A stock may be raised in two ways, either of which calls for little trouble or expense.

Plants from Seed.—Raising from seed is perhaps the easiest way for the beginner, although where forcing crowns are desired at the earliest possible date, the second method here detailed should be adopted.

The seed should be sown in a portion of heavily manured and deeply dug ground as early in April as possible; selecting an open site, and if more than one row is to be sown, allow not less than 15 ins. between each, the drills being made about 2 ins. deep. The seed is large and usually germinates very well, so this is best dropped in pairs at intervals of 9 ins. up the drill; overcrowded rows with their attendant evils may thus easily be guarded against. Where both these seeds develop into plants, the weaker should be removed before it gets many inches out of the ground, care being taken not to loosen the one remaining. The subsequent treatment consists of weeding and hoeing, and, if very dry, giving water in goodly quantities in order that growth may not be arrested.

Early the following spring, transplant into other deep rich soil, not less than 15 ins. apart each way. Weeds must again be kept in check, and both clear water and liquid manure freely supplied throughout the summer.

Plants from Cuttings.—Propagation from cuttings of the old roots is the plan most generally adopted. This entails less labour and certainly gives good forcing crowns a year in advance of those from seed.

Cuttings about the thickness of a man's little finger or stout pencil should be taken early in the winter, always removing the portion nearest the stem quite level, the other in a slanting position, this being necessary to distinguish the top from the bottom. The length of these cuttings is not important; anything from 3–6 ins. will answer equally well. When prepared as indicated, tie up in bundles of a dozen or so, and store nearly level with the tops in boxes filled with dry earth, standing these in a shed safe from severe frosts.

By early spring each of these cuttings will be showing numerous miniature heads round the outside of the top. All excepting the two strongest of these should be removed, and planting in the open done as advised for one-year-old seedlings, covering the crown with a few inches of fine soil. Later on, when the stronger of the two shoots can be discerned, pull away the weaker. By very liberal feeding with manure water and an occasional light dressing of common salt, encourage the plants to form strong forcing crowns the first season. It should be pointed out that it is only where the rows are fed on the liberal scale advised that such crowns are obtained, plants left to themselves being of little use until two years old.

If not required for forcing, the whole batch may be allowed to remain untouched until the early spring, when permanent beds may be formed in the open. The plants may be set in rows 2 ft. apart and 18 ins. asunder, which method is a good one to adopt where early produce is to be grown with the aid of long wooden troughs and plenty of dry leaves and manure. Where it is intended to use special Seakale pots, plant three strong crowns to form a triangle at 1 ft. apart, allowing 3 ft. between each batch of three. Make a point of removing all flower spikes before the flowers open. If cooked, these stems make a most excellent green vegetable.

Early produce may also be had from plants in the open by covering the strongest of the crowns with a good heap of coal ashes early in March; large cracks in the ashes will indicate the growth of the kale beneath. After forcing plants in the open, plenty of rich manure should be placed around the crowns, and ample moisture provided during the season, allowing two years before the same clumps are again forced into growth.—F. R. C.

For Method of Bottling see *Vegetable Bottling.*

SEAKALE BEET.—See *Beet, Seakale* or *Silver.*

SEASIDE ALDER (***Alnus maritima***).—See *Trees.*

SEASIDE ASTER (***Aster Tripolium***).—See footnote to article on *Aster.*

SEASIDE GARDENS: Plants and Trees for.—The gardener who has spent most of his life in inland gardens will find, on being transferred to the sea-coast, that he is very much "at sea." In many cases, plants that would have to be carefully protected through the winter away from the sea would flourish on the sea-coast; in other cases, plants that would survive many degrees of frost inland would be withered out of recognition if exposed to a gale blowing from the sea and laden with salt spray.

Plants growing by the sea are wonderfully immune from damage by frost. Dahlias, for instance, may successfully withstand four or five degrees of frost in a sheltered spot on the sea-coast, although the slightest frost will terminate their existence for that year in inland gardens.

To those who are fortunate enough to possess a garden by the sea, the formation of a rock garden is strongly recommended. Its delights are never-ending, and by careful planning and arrangement it can be formed to afford protection to numerous little gems of the floral world whose home is among the Swiss Alps or in the Pyrenees. The intense pleasure to be derived even from a small rock garden is inestimable. It is quite possible to have rock plants in flower from January to December. Most alpines succeed well in seaside gardens in suitable positions.

With regard to Shrubs and Trees, every care should be taken to make them perfectly secure by careful staking and tying; and in preference only subjects of a dwarf, sturdy nature should be planted, since they will require less staking and will withstand the wind far better.

On exposed parts of the sea-coast it is advisable, when laying out a garden, to plant a belt of trees, such as *Pinus austriaca* or other hardy subjects, which will eventually afford protection for the more delicate plants.

Lastly, the best advice that can be given is to treat all subjects generously in the way of manure, and not to ignore their special likes and dislikes. Seaside gardening is, as a rule, regarded as gardening under adverse conditions, but if the various subjects are well looked after, there is no reason at all why they should not be a lasting success, if not indeed "a joy for ever."

What to Grow.—The following lists of plants suitable are given as a result of many years' experience of seaside gardening, and although exposed to severe north and north-east gales, it has been possible, by careful protection, to grow beds of such things as Schizanthus, Tuberoses, etc., and to have Roses in bloom out of doors to grace the dinner-table on Christmas Day.

Annuals.—The following succeed very well, and may be sown outside in mid-April :—

Alyssum lilacina, mauve.
A. Little Dorrit, white.
Anagallis coccinea (Scarlet Pimpernel).
A. caerulea (Blue Pimpernel).
Brachycome iberidifolia, blue.
B. iberidifolia alba, white.
Calendula officinalis Orange King.
Convolvulus minor, various shades of blue and white.
Dimorphotheca aurantiaca, orange.
Godetia Crimson Glow, crimson.
Leptosyne maritima, yellow.
Limnanthes Douglasii, yellow and white.
Linum grandiflorum rubrum, scarlet.
Lupinus nanus, blue and white.
Nemophila insignis, blue.
N. insignis alba, white.
Phacelia campanularia, gentian blue.
Saponaria calabrica Scarlet Queen.
Silene pendula compacta, rose.
Venus's Looking Glass, blue and white.
Virginian Stock, many colours.
Viscaria cardinalis, deep scarlet.
V. oculata, pink.

Herbaceous Perennials.—The following are most suitable :—

Acanthus mollis, white and rose.
Achillea Ptarmica The Pearl, white.
Aconitum Fischeri, blue.
Anchusa italica Dropmore and *Opal*, dark blue and pale blue.
Anemone japonica, many colours.
Aster Amellus (dwarf varieties), in blue and white.
Astrantia major, pink.
Buphthalmum salicifolium, yellow.
Campanula celtidifolia, milk-blue.
Centranthus ruber, in crimson, rose, and white.
Coreopsis grandiflora, yellow.
Delphiniums (dwarf varieties), blue.
Erigeron speciosus, deep mauve with yellow centre.
Eryngium alpinum, metallic blue.
Fuchsia exoniensis, scarlet and purple.
F. gracilis, scarlet and purple.
F. Riccartoni, scarlet.
Funkia in variety, many colours.
Gaillardia in variety, many shades of crimson and yellow.
Galega Hartlandi, blue and white.
G. officinalis, blue and white.
Glaucium flavum, yellow.
Gypsophila paniculata, white.
Hedysarum coronarium, carmine.
Helenium Hoopesi, orange.
H. pumilum magnificum, dwarf, yellow.
Helleborus niger in variety, white and purple.
H. orientalis, mixed colours.
Hemerocallis in variety, orange-yellow, red, etc.
Heuchera in variety, pink, red, and white.
Kniphofia (dwarf hybrids), in variety of colours.
Phlox decussata (dwarf varieties), in many colours.
Romneya Coulteri, pure white with yellow stamens.
Rudbeckia Newmani, yellow.
Scabiosa ochroleuca, sulphur yellow.
Spiraea Aruncus, cream.
Statice latifolia, blue.

Rock Plants.—The following succeed splendidly :—

Acaena microphylla, crimson burrs.
Acantholimon glumaceum, rose.
Achillea ageratifolia, white.
A. rupestris, white.
Æthionema grandiflorum, rose.
Alyssum saxatile, yellow.
Androsace sarmentosa, rose.
Anemone Pulsatilla, pale purple.
Antirrhinum sempervirens, creamy white.
Arabis albida, white.
A. aubrietioides, pink.
Arenaria balearica, white.
A. montana, white.
Armeria latifolia, rose.
Aster alpinus, purple.
Aubrietia in great variety, pink, purple, etc.
Campanula carpatica, *fragilis*, *garganica*, *muralis*, and many other useful varieties in shades of blue and white.
Cheiranthus Allionii, orange-yellow.
Coronilla cappadocica, yellow.
Crucianella stylosa (Syn. *Phuopsis stylosa*) (trailer), pink.
Dianthus caesius, *deltoides*, *hybridus*, and *neglectus*, in range of colour.
Dryas octopetala, white.
Erigeron mucronatus, white, changing to red.
Erinus alpinus, white to purple.
Gentiana acaulis, bright blue.
Gypsophila cerastoides, white.
G. repens, white.
Helianthemums in variety, with their range of colour.
Hippocrepis comosa (trailer), yellow.
Hypericum repens, yellow.
Iberis saxatilis, white.
I. sempervirens, white.
Leontopodium alpinum (Edelweiss), silvery foliage and white flowers.

Linaria alpina, hepaticaefolia, and *pallida,* in range of colours.
Linum flavum, golden-yellow.
L. narbonense, blue.
Lithospermum prostratum Heavenly Blue, blue.
Lychnis haageana, various shades of crimson, red, etc.
Mentha Requieni (sweet-scented carpeter), purple.
Morisia hypogaea, yellow.
Œnothera macrocarpa, yellow.
Onosma tauricum, yellow.
Oxalis enneaphylla, white.
Papaver alpinum, in range of colour.
Phlox subulata, in many varieties, and in range of colour.
Plumbago Larpentae (Syn. *Ceratostigma plumbaginoides*), violet-blue.
Polygonum affine (Syn. *P. Brunonis*), rose.
P. vaccinifolium, rose-pink.
Primula marginata, purple and rose.
P. viscosa, rosy-purple.
Ramondia pyrenaica,[1] lilac.
Saponaria ocymoides (trailer), pink.
Saxifraga, most varieties, in range of colour.
Sedum, most varieties, in range of colour.
Sempervivum, most varieties, in range of colour.
Silene alpestris, white.
S. Schafta, pink.
Thymus lanuginosus, purple.
T. Serpyllum coccinea, scarlet.
Tunica Saxifraga, pink.
Verbena chamaedryoides (trailer), scarlet.
Veronica gentianoides, pale blue.
V. rupestris, blue.
V. saxatilis, blue.
Viola cornuta, blue.
V. gracilis, blue.

SHRUBS.—The following may well be grown, and those marked with a star are useful for walls and trellises :—

**Ampelopsis,* in variety.
Arbutus Unedo.
**Azara microphylla.*
Berberis Darwinii.
B. stenophylla.
Buddleia globosa
B. variabilis veitchiana.
Choisya ternata.
Cistus ladaniferus.
Colutea arborescens.
C. cruenta.
**Cotoneaster microphylla.*
Diplopappus chrysophyllus.
Escallonia langleyensis.
E. macrantha.
E. rubra.
Euonymus japonicus.
**Forsythia suspensa.*
Garrya elliptica.
Griselinia littoralis.
Hydrangea hortensis.
Hypericum calycinum.
H. moserianum.
**Jasminum nudiflorum.*
**Kerria japonica fl. pl.*
Leycesteria formosa.
**Magnolia grandiflora.*
M. Halleana.
Olearia Haastii.
O. macrodonta.
O. stellulata.
Osmanthus, in variety.
**Polygonum baldschuanicum.*
Skimmia japonica (male and female).
Spiraea discolor.
Tamarix gallica.
Ulex hispanica.
Veronica Andersoni.
V. Autumn Glory.
V. salicifolia.
V. Traversii ; etc.

TREES.—The list of trees that really flourish by the sea is very limited. The following stand the winds remarkably well :—

Acer Pseudo-platanus (Sycamore).
Alnus glutinosa (Alder).
Pinus austriaca (Austrian Pine).
Pyrus Sorbus (Service Tree).
Quercus Cerris (Turkey Oak).
Ulmus montana (Wych Elm).

A. C. A.

SEASIDE HARD GRASS (*Lepturus cylindricus*).—See *LEPTURUS.*

SEASIDE SPURGE (*Euphorbia Paralias*).—See *EUPHORBIA.*

SEATS.—See *GARDEN FURNITURE.*

SEAWEED AS MANURE.

Why is seaweed not used more as a manure ? This is a question one cannot help asking with the increasing scarcity of stable and farmyard manure. Probably the answer is that gardeners do not use it largely because most of them do not know how to do so to the best advantage. Hence the following suggestions may prove useful.

---

[1] This requires a north aspect.

Burning Seaweed.—Where there are immense tracts of seaweed available for gathering, as is the case in some parts of the east coast and in Scotland, the material might well be burnt, as garden rubbish is burnt for the sake of the salt and potash it contains. The resulting ash is similar to wood ashes, but is sometimes known as KELP, and may be used at the rate of 4 oz. per sq. yd. for most crops.

Humus from Seaweed. — The above process is very wasteful and should only be adopted where there is a large excess of the weed. In other cases a few tons should be collected on the beach in the early autumn, and carted up to the garden to be made into a stack on similar lines to a manure stack. The material may be piled up alone, or mixed with an equal quantity of hot fermenting stable dung or vegetable humus. If it is stacked alone it takes longer to rot, and should not be disturbed for six months, or, better still, twelve. It will then have turned into a soft, mild humic manure not unlike old cow manure, but of course much more salty. If it is stacked with hot stable manure, the material will be ready for digging in after being stacked for two or three months, while if mixed with vegetable refuse a period twice as long is required for surface digging-in, though for trenching the material may be used after being stacked for about eight weeks.

Crops Benefited by Seaweed.—All salt-loving crops are greatly benefited by a timely application of seaweed manure. It is most excellent for use in pea, bean, celery, and leek trenches and for top-dressing asparagus beds. It is not so suitable for potatoes, as these object somewhat to its salty nature.

E.

SECALE (Nat. Ord. Gramineæ).

One species of this genus is sometimes grown as a green manuring crop in gardens. This, *S. cereale* (Syn. *S. montanum*), is the RYE well known to farmers, from which black or rye bread is made abroad. It must not be confused with RYE GRASS and ITALIAN RYE GRASS mentioned in our notes on the genus *LOLIUM*, from which it is quite distinct though used for the same purposes in the garden.

SÉCATEURS.—See *GARDEN TOOLS*.

SEDGE.—See *CAREX*.

SEDIMENTARY ROCK.—See under KINDS OF ROCKS in *GARDEN GEOLOGY*.

SEDUM (STONECROP. Nat. Ord Crassulaceæ).—These plants comprise a large number of valuable garden subjects, and are so well-known that little is necessary by way of description. All are characterised by succulent, or fleshy foliage, this enabling them to resist long periods of drought without injury. They are valuable for dry positions. The taller species are excellent for borders, beds, or rock-work, while the dwarfer sorts are of high value for carpeting purposes, such as carpet bedding, or for covering spaces occupied by early-flowering bulbs. Many of them will flourish on roofs or dry walls, and flower even better there than in what would appear happier conditions. Cultivation is simple. The taller Stonecrops appreciate a fairly good soil, and the dwarfer species are better for the drier places. A considerable number flower more freely if there is an admixture of lime in the soil. This can be supplied by the addition of some old mortar, broken small. It is surprising the difference this makes in the case of certain subjects, such as our native *S. acre*. Propagation is remarkably easy. Pieces of branches broken or cut, or little bits of the tufted species inserted in sandy soil, are almost certain to root freely. Division is easily performed with many of the Stonecrops. Some species are readily raised from seeds sown in sandy soil in pots or pans in spring, and the plants set in their permanent positions in autumn or the following spring. The greater number of those named are hardy perennials, but there are a few pleasing annuals, among which *S. coeruleum*, the BLUE STONECROP, deserves special mention as a gem for rockeries. Sow this where it is to bloom in April.

SELECTION OF SORTS.

Sedum acre.—The BITING STONECROP, with yellow flowers from June onwards. Height, 2–3 ins. *S. a. aureum* has yellow leaves; *S. a. elegans* has silvery tips; and *S. a. major* is larger in all its parts.

S. Aizoon.—Yellow flowers from June onwards. Height, 1 ft.

S. album.—The WORM GRASS, with white flowers from June onwards. Height, 3–6 ins.

S. amplexicaule.—Yellow flowers in June. Height, 6–9 ins.

S. Anacampseros. — The EVERGREEN ORPINE, with purple flowers in July. Height, 1 ft.

S. anglicum.—Whitish flowers in July. Height, 2 ins.

S. anopetalum.—Greenish-yellow flowers in July. Height, 6 ins.

S. arboreum.—A tender sort with white flowers in July. Height, 6–12 ins.

S. asiaticum.—Yellow flowers in July. Height, 6–12 ins.

S. beyrichianum. — White flowers in July. Height, 2 ins.

S. brevifolium.—This sort suffers from winter wet, and bears white flowers in July. Height, 2 ins. *S. b. Pottsii* has fine foliage.

S. coeruleum.—The BLUE STONECROP, with pale blue flowers from July onwards. It is an annual. Height, 2–4 ins.

S. dasyphyllum.—Pinkish flowers in July. Height, 2–3 ins. *S. d. glanduliferum* is similar to the above.

S. Ewersii. — Pink flowers in August. Height, 6 ins. *S. E. turkestanicum* has red flowers.

S. Fabaria.—Syn. *S. Telephium.*

S. hispanicum (Syn. *S. glaucum*). —Whitish-pink flowers in July. Height, 3–4 ins.

S. hybridum.—Yellow flowers in August. Height, 1 ft.

S. japonicum.—Yellow flowers in July. Height, 6 ins.

S. kamtschaticum.—Yellow flowers in August. Height, 4–6 ins.

S. lydium.—Pinkish flowers in June. Height, 1–2 ins.

S. Maximowiczii.—Yellow flowers in July. Height, 1 ft.

S. maximum.—There are several varieties of this bearing white and red flowers in July. Height, 1–2 ft.

S. middendorfianum. — Yellow flowers in June. Height, 1 ft.

S. obtusatum.—Yellow flowers in July. Height, 6 ins.

S. obtusifolium.—White flowers in June. Height, 4–6 ins.

S. oppositifolium.—White flowers in July. Height, 6 ins.

S. populifolium.—White or pinkish flowers in August. Height, 6–10 ins.

S. pruinatum.—Yellow flowers in July. Height, 1 ft.

S. reflexum.—The STONE ORPINE, with yellow flowers in July. Height, 6–8 ins. There are other varieties which vary slightly. The most distinct is *cristatum.*

S. roseum (Syns. *S. Rhodiola* and *Rhodiola rosea*).—The ROSE ROOT, with rose flowers in June. Height, 9–12 ins. There are several varieties of little consequence.

S. rupestre.—Yellow flowers in

July. Height, 6 ins. *S. r. monstrosum* is distinct and curious.

S. sarmentosum.—Greenish-yellow flowers in July. Height, 6 ins. *S. s. variegatum* has leaves striped white.

S. Sieboldii.—This is a tender sort in some parts. It has pink flowers in August. Height, 9–12 ins. *S. S. mediopictum* has leaves blotched white.

S. spathulifolium.—Yellow flowers in June. Height, 3 ins.

S. spectabile.—Pink flowers in September. Height, 12–18 ins. *S. s. atropurpureum* has red flowers.

S. stoloniferum (Syn. *S. spurium*). — Pink flowers in July. *S. s. album* has white flowers, and *S. s. splendens* red flowers.

S. telephioides.—Pink flowers in June. Height, 6–12 ins.

S. Telephium (Syn. *S. Fabaria*).—The ORPINE, with pink, purple, or white flowers from July onwards. Height, 12–18 ins. There are numerous varieties of this, including *Fabaria.*—S. A.

SEED : AMOUNT REQUIRED.

The following table, taken by permission from *Food Production Leaflet, No.* 8, published by the Ministry of Agriculture, gives the amount of seed required for planting a 10–12 sq. rod allotment :—

KIND OF CROP.	LENGTH OF ROW.	SEED REQUIRED.
Beans, Broad (2 rows) . . .	50 ft.	$\frac{1}{2}$ pt.
Beans, Dwarf (2 rows) . . .	50 ,,	$\frac{1}{4}$,,
Beans, Runner (2 rows) . . .	50 ,,	$\frac{1}{2}$,,
Beet, Globe	100 ,,	$\frac{1}{4}$ oz.
Beet, Long	100 ,,	$\frac{1}{4}$,,
Beet, Spinach	100 ,,	$\frac{1}{4}$,,
Broccoli, Early (60 plants) . . .	...	$\frac{1}{16}$,,
Broccoli, Late (60 plants) . . .	...	$\frac{1}{16}$,,
Broccoli, Sprouting (125 plants) . .	...	$\frac{1}{8}$,,
Brussels Sprouts (125 plants) . .	...	$\frac{1}{8}$,,
Cabbage, Autumn (125 plants) . .	...	$\frac{1}{8}$,,
Cabbage, Spring (125 plants) . .	...	$\frac{1}{8}$,,
Carrot, Intermediate	75 ft.	$\frac{1}{8}$,,
Carrot, Long	75 ,,	$\frac{1}{8}$,,
Cauliflower, Early (60 plants) . .	...	$\frac{1}{16}$,,
Cauliflower, Late (60 plants) . .	...	$\frac{1}{16}$,,
Celery (125 plants)	...	$\frac{1}{32}$,,
Kale, Cottagers (125 plants) . .	...	$\frac{1}{8}$,,
Kale, Curled (125 plants) . . .	...	$\frac{1}{8}$,,
Leek	90 ft.	$\frac{1}{8}$,,
Lettuce, Cabbage	60 ,,	$\frac{1}{8}$,,
Lettuce, Cos	60 ,,	$\frac{1}{8}$,,
Onion, Autumn	120 ,,	$\frac{1}{4}$,,
Onion, Pickling	45 ,,	$\frac{1}{4}$,,
Onion, Spring	120 ,,	$\frac{1}{4}$,,
Parsnip	75 ,,	$\frac{1}{4}$,,
Pea, Dwarf (2 rows)	40 ,,	$\frac{1}{2}$ pt.
Pea, Tall (2 rows)	40 ,,	$\frac{1}{2}$,,
Savoy Cabbage (125 plants) . .	...	$\frac{1}{8}$ oz.
Spinach	120 ft.	$\frac{1}{2}$,,
Spinach Beet	100 ,,	$\frac{1}{4}$,,
Turnips, Spring	75 ,,	$\frac{1}{8}$,,
Turnips, Summer	75 ,,	$\frac{1}{8}$,,
Vegetable Marrow	...	12 seeds.

SEED: AVERAGE GERMINATION OF. The following is the average percentage germination of all the more important vegetable seeds, taken by permission from *Food Production Leaflet, No.* 8, published by the Ministry of Agriculture. It is very important to all gardeners, especially those requiring definite numbers of plants for special purposes. Thus, if a thousand tomato plants are needed, it is not enough to sow 1000 seeds, as the average germination is only 80%. Calling 80% $\frac{4}{5}$ of 100, the number of seeds required is

$$\frac{5}{4} \text{ of } 1000 = \frac{5}{\cancel{4}} \times \overset{250}{\cancel{1000}} = 1250.$$

In exactly the same way the other percentages may be calculated; thus, 75% is $\frac{3}{4}$ of 100, so if a seed germinates up to 75% and 1000 plants are required, you will have to sow $\frac{4}{3}$ of 1000 = 1333⅓, or 1334 seeds.

VEGETABLE.	PER CENT.	VEGETABLE.	PER CENT.
Bean, Broad	90	Leek	60
Bean, French	90	Lettuce	88
Bean, Kidney	90	Marrow	80
Bean, Scarlet Runner	90	Mustard	80
Beetroot	70	Onion	75
Broccoli	80	Parsley	50
Cabbage	80	Parsnip	25
Carrot	55	Pea	80
Cauliflower	80	Pumpkin	75
Celery	50	Radish	80
Chicory	80	Salsafy	90
Cress	80	Spinach	68
Cucumber	80	Tomato	80
Kale	80	Turnip	75
Kohl Rabi	80	Vegetable Marrow	80

SEED BEDS: MAKING.—See *TREES: RAISING FROM SEED.*

SEED CROPS.—See *KINDS OF CROPS*, and under CROP REQUIREMENTS in *MANURES.*

SEED LISTS.—See *WINTER GARDEN, THE.*

SEED POTATOES: SAVING. — See *SAVING SEED POTATOES.*

SEED PROTECTORS.—See *GARDEN APPLIANCES*, and under WIRE NETTING in *GARDEN NETTING.*

SEED SAVING.

What are the ideal conditions at which to aim in seed saving, either by the small or the large grower? They may be considered under three heads: (1) Fruits; (2) Vegetables; (3) Flowers.

Fruits.—It is well known that the seeds of many fruits such as apples, cherries, pears, plums, etc., seldom reproduce types anything like as good as the parent: that is to say, if they have been selfed or fertilised with their own pollen; but show a great tendency to revert to the wild parents, and many varieties will refuse to fertilise with their own pollen. Definite crosses must be effected by removing the stamens from the flowers before the blossoms have fully opened, and conveying pollen from another variety to the stigmas of those flowers from which the petals have been removed. After the operation the flower should be bagged and marked. The pips and stones may be removed from the fruits when ripe and kept in sand until they can be sown. The sand should be dry and kept in a cool place. Seeds of soft fruits, such as gooseberries, raspberries, and strawberries may be removed from the fruits with a knife or washed out and sown immediately. Seeds of cucumbers, tomatoes, and vegetable marrows which are really fruits although classed as vegetables should be washed out after care has been taken to select the finest and ripest fruits true to the type of the variety. If more than one variety of tomato is being grown in the same house there is again danger of crossing, and steps to prevent this must be taken by protecting the selected flowers. The seed when clean should be slowly dried in the sun, and stored away in a cool, dry room, until sowing time arrives. In the case of cucumbers and marrows the fruits should be artificially pollinated and allowed to get dead ripe, when they may be cut open and the seed extracted and stored in packets or bags. The same applies to melons, and it is desirable that seed should only be saved when each variety is grown separately.

Vegetables.—Seed may be saved of beet, carrot, and parsnip when one variety only is grown in the garden. Good equal-sized roots true to type should be selected first of all, and these roots should, in the case of beet and carrots, be stored in a frost-proof shed for the winter, and planted out in the spring when the danger of severe frost is past. Not less than 18 ins. between the rows and 15 ins. between the roots should be left, and wider planting is desirable if space will admit. In the case of parsnips the selected roots may be planted at once as they will stand the winter quite well. The following season they will throw up strong stems which will branch. The parsnip and carrot will produce what are termed "crown" or "king" heads, and lateral heads, *i.e.* side heads. The crown or king heads are first ripe and the usual custom is to cut them and place them in bags. The lateral heads are harvested later by cutting off the entire stem and stacking or housing them until they are dry, when the seed may be threshed or beaten out and dressed.

The seed from the "king" heads is the largest and finest and would be shed in the case of parsnips before the laterals were ripe. It is well to add that parsnip seed deteriorates very rapidly and should not be kept for a second season. Carrot seed can nowadays be dressed so as to remove the appendages and obviate the sowing with sand to obtain even distribution. Beet seed is harvested by cutting the entire stem and laterals, putting into "shock" or "stook," and eventually stacking and storing until it can be threshed. When the seed of only a few plants has to be dealt with, as in the case of the amateur, the threshing may be done with a flail or mallet.

THE CABBAGE FAMILY.—Seeds of all the plants of this family must be harvested quickly before the pods burst. It is then shocked and later stacked, after which it may be threshed during the winter. All the plants of this family are readily cross-fertilised by other varieties of the same family and by cruciferous weeds; they are visited by bees and largely patronised by most flies; thus the risk of crossing is very great. It is difficult to see how pure stocks can possibly be secured by the allotment holder or private gardener unless special precautions are taken to protect them from insects and foreign pollen. The seed of this family is easily kept in a dry storeroom and does not readily deteriorate in germinating capacity even if kept for several seasons.

OTHER CROPS.—Fine types of parsley, if selected for seeding, should be protected by bagging before the heads are in bloom, cut and stored when dry, and threshed out. On a large scale the crop must be very carefully "rogued."

Celery, lettuce, and radish can be quite readily seeded if the precautions already referred to are taken.

Onions are seeded by selecting good average typical bulbs and planting in March. Each bulb should make from 3–5 flower heads, which are usually supported by ropes run along the rows. When the heads begin to ripen they are often cut with the upper portion of the stem and inserted in the cup, or basal part of the flower stem. This keeps them upright and hastens ripening when they are later hung in bunches in sheds or granaries with sheets spread on the floor to catch falling seed. Leeks can be seeded in the same fashion, and the seed when properly matured will keep for several seasons, although the vitality and percentage of germination gradually go down.

Peas and Beans.—These are the easiest of all crops from which to save seed, as there is no danger of cross fertilisation. The best and most uniform pods are selected, and these allowed to become nearly ripe when they are gathered, dried in the sun, shelled, and stored in paper or Hessian bags till required for use. The first crop of pods produced should be selected for seed purposes, not the pods left on the haulms after picking and marketing a portion of the crop, as these pods are usually of inferior quality.

Potatoes.—These may be raised from seed by special crossing, or the ordinary plums (fruits) may be picked in the autumn and placed in small tin boxes amongst dry sand after holes have been pierced in the lids to admit air and allow moisture to escape. If the small tins are kept in a dry atmosphere all the winter, the fruits dry up and may be rubbed down in the spring and sown along with the sand. The saving of *Seed Tubers* is dealt with in our article on *Saving Seed Potatoes.*

Flowers.—Annuals, biennials, and perennials may be seeded and selected by small growers as well as large. The same difficulty with regard to crossing has to be guarded against in many flowers, and when a good type has been secured, the plant to be seeded should be surrounded by fine muslin just as the flowers begin to open. If this be done the variety will come fairly true to type; for instance, the true type of *Antirrhinum Nelrose* can be retained if precautions against cross pollination are taken.

Ordinary herbaceous plants as a rule come fairly true from seed, though it is often policy to remove several of the weak capsules on plants which are being selected for seeding, and when the seed has become plump the capsules may be removed with a part of the stems, or the whole plant may be pulled up, placed in a paper bag, and hung from the roof of a dry shed or storeroom. Care must be taken that proper ventilation is given at the upper end of the bag to prevent moulding in the process of drying. Podded plants may also be removed in a green state if the seeds are fully developed, and the haulms or stems spread on the floor of a dry building or on shelves, or hung from the roof. The seed can then be extracted at leisure during winter. This applies also to vegetables such as peas, kidney and runner beans, etc. The seed should not be kept in a very warm room, otherwise it may become over ripened, in which case it will germinate very badly or take much longer to come above ground. On the other hand there must be no excess of moisture in the atmosphere, otherwise the cuticle will become soft and the reserve material in the seed will begin to change and premature germination or decay will follow. When once this change has begun in a seed it is impossible to check it effectively, and if the seed is not in a position favourable for germination, fermentation will set in and the seed will die.

Although expert private gardeners can often successfully save their own seed, the practice in the case of small growers and allotment holders is not to be whole-heartedly recommended.

In normal times good seed can be obtained at a reasonable price, and the saving and selection had much better be left in the hands of reputable seed firms, who, through long experience, have specialised and become expert in the process. On the other hand, the crossing and raising of new varieties should be encouraged amongst all growers. In fact the horticulturist who, during his life, never tries to raise new seedlings of some class of garden produce is not worthy of the name, for the operation is interesting, educative, and ennobling. See also our article on *Hybridising and Cross Breeding*.—G. P. B.

SEED SOWING.

This is a most important gardening operation, because on the proper method of sowing your seeds to a large extent depends whether you will have a good crop or a bad one.

There are a great many different kinds of seed, but when the fundamental principles of seed sowing are once grasped, no mistake may be made, even though you are about to sow many kinds with which you have had no previous experience.

First of all let us get to know the seed itself. Take a large one (the pea, for example). When we examine it carefully, we find it has a more or less hard, tough skin (the *testa*). On removing this, we find a hard substance which can be divided into two halves (the seed leaves or *cotyledons*). Between these seed leaves we can see the little baby plant (or *embryo*).

The skin protects the seed leaves and baby plant. The former are simply a mass of cells filled with food material for the use of the baby plant when growth commences.

The conditions necessary to start the baby plant into growth (germination) are three in number :—

(1) Moisture.
(2) Heat.
(3) Air.

The moisture softens the skin and makes it porous, and some of it passes through and softens the hard substance in the cells of the seed leaves, and also the cells themselves. The necessary heat ensures that the food substances within the cells are changed into the suitable form of food for the little baby plant. And all growing plants require a sufficient supply of air to enable them to breathe, and they also extract part of their food (carbon dioxide) from it.

Now seeds are of various sizes, and must therefore contain varying amounts of food substances for the baby plant. Then all the food substances taken up from the soil by the roots of plants must pass up to the green leaves and there, under the action of sunlight, in combination with the carbon dioxide taken in from the atmosphere, they are manufactured into the substances which form the cell walls and all contents of the growing plant. We must see, therefore, that our seeds are sown at the proper depth, so that, before all the food substances stored up in each seed are used up, the little plant will have reached the surface of the soil and spread out its green leaves to the action of the sunlight, there to carry on the work of the growing plant.

With a knowledge of these fundamental principles, there should be no difficulty with regard to the sowing of any kind of our garden seeds.

There are two periods in the year when the conditions are ideal for the sowing of seeds—spring and autumn; though, of course, seed may be sown throughout the summer, when the conditions are naturally suitable, although in a very dry summer it is often necessary to supply artificial measures to atone for nature's shortcomings. The conditions with regard to moisture and air are always practically the same, when there is a slight film of moisture round the particles of soil, but not sufficient to fill the pores between the particles of soil and reach the germinating seed. A good guide to determine if the soil is suitable with regard to moisture is to take a handful of it from the surface of the seed bed, and press it in your hand; then open your hand and if the ball just falls to pieces the soil is in the right condition for seed-sowing. If, however, it clings together in a solid mass it is too wet and should be allowed to dry further. The amount of heat required for successful germination depends on the nature of the seed itself. Some of the seeds of our garden weeds will germinate a few degrees above freezing-point; while the seeds of plants from tropical countries require a brisk bottom heat of from 60° to 70° F. to ensure germination. For the majority of our outdoor vegetables and flowers, from the middle of March to the middle of May and during August, there will be sufficient heat to ensure successful germination.

If it is desired to sow seeds for successional crops when the soil is very dry, the drills should be drawn in the usual way and then well watered before sowing the seed and covering up. Never water the surface of the soil after sowing and covering the seed, as, in all probability, the water will not reach the seed, but will "cake" the surface of the soil, and prevent the air from reaching the seed.

The nature of the growth of plants should be taken into account, with regard to the distance at which to sow the rows of seed, but room should always be left to work the hoe for weeding and conserving the moisture between the lines of plants. Rows of carrots, leeks, onions, parsley, etc., may be sown 1 ft. apart; while the stronger-growing plants, such as beetroot, parsnips, turnips, etc., should have from 15 ins. to 18 ins. between the rows, to give them room to develop.

In sowing any kind of seed the greatest care should be exercised not to sow it too thickly. It is a waste of seed, and when the little plants appear above the soil, the competition which goes on for the food substances available from the limited space occupied by the rootlets, and for the sunlight, weakens the plants considerably, with consequent bad effects on the crop. Always buy seeds of first quality and sow thinly, giving each plant plenty of room to develop in its early stages. This is very important with seeds sown in the greenhouse or frame. With too thick sowing and a humid atmosphere you simply invite attacks of disease, especially the damping off disease (*Pythium*).

For outdoor sowing the seed-bed should be brought to a fine tilth by raking over and breaking the clods. The ground should next be marked out for the rows the required distance apart. After this the line should be carefully set and the drills drawn the required depth, being very careful to have them perfectly level in the bottom to ensure uniform germination and a good crop. In order to make the seed go as far as possible, instead of sowing thinly all along the drills, drop four or five seeds at intervals of 3 ins. apart for onions and carrots, thinning out when large enough, leaving one plant where each clump was; when they are large enough to use in soups or for salads, remove every alternate one, leaving the remainder 6 ins. apart to mature. For beetroot and parsnips drop four or five seeds at intervals of 7–9 ins. apart, thinning out when large enough, leaving one plant where it is to mature. [Very thin sowing is advised in the case of hardy flower seeds, especially for annuals.—EDITOR.]

The depth to sow seeds varies with their size. Calceolaria seed is so small that it should not be covered with soil. The surface of the soil in the pot or pan should be made quite level, and the seed sown thinly and pressed into the soil. The pot should then be covered over with glass and paper, until germination takes place. Wipe the moisture from the under side of the glass each morning. Poppy seed is also small and should only be covered with about a quarter of an inch of soil.

Turnip, carrot, leek, onion, lettuce, and similar seeds may be covered with 1 in. of soil. Radish, parsnips, beetroot, and such like may be covered with 1½ ins. of soil. Pea, lupine, and other large seeds may be covered with about 2–2½ ins. of soil. Broad beans, runner beans, etc., may be covered with 3 ins. of soil.

Some seeds germinate best as soon as ripe, for instance, clivias, while others, such as holly and hawthorn, take two years to germinate. These latter seeds may be mixed with moist sand, left for a year, and then sown in the ordinary way. Very hard seeds, such as some palms, may be chipped before sowing. Some hard seeds may also be steeped in tepid water for twenty-four hours before sowing as, for instance, the canna and sweet pea.

Seeds will retain their power of germination for varying periods, but the majority are better sown the year after harvesting. A few will retain the power for two, five, or seven years, and melons have successfully germinated after fifteen years, though this is very exceptional.

W. GD.

SEED TESTING.

The introduction in 1917 of the first Seed Testing Order, which involved the creation of a Government Seed Testing Station—located at present (October 1919) in London, but eventually to be permanently installed at Cambridge—was welcomed in England by the more advanced seed firms, who had long recognised the necessity of testing farm and garden seeds before despatching the same to their customers. The new measure had one great advantage, namely, it levelled up the method of testing and made it uniform. Before the Government Order was promulgated, however, the average sample of agricultural and horticultural seed had immensely improved in quality, especially during the last twenty years, more particularly as regards cleanliness and freedom from weed seeds, though the ordinary "market sample" remained a dangerous thing to handle on account of its impurities. This advancement had been achieved by the enterprise of firms who had, at heavy expense and from high motives of the importance of agriculture and horticulture to the community, laid down and constantly reconstructed their seed-cleaning machinery, so that when the Order in question was inaugurated seeds practically pure and of the highest germinating power were readily procurable in accordance with the rules subsequently enforced by the Seed Testing Order. This Order is shortly to be improved and introduced into the House of Commons, where it will doubtless become incorporated as an Act of Parliament. Notwithstanding all this it must be admitted that, except in the case of hand-picked seeds, a perfect sample is not to be found in commerce. By "perfect" is meant a sample of seed in which every grain is of the variety stated. For instance, a sample of beet, cabbage, or carrot would have no extraneous matter either in the way of other seeds or impurities. But although a perfect sample is rarely to be met with, it is desirable that the percentage of seeds which are true to name of any particular kind should be ascertained as well as its germinating capacity. Briefly, therefore, samples of seeds are examined and tested with a view to determining their "purity" and "germination."

The Purity Test.—Considering this first, the points to be ascertained are :—

(1) Whether the seed is true to name.

(2) What other useful seeds are present.

(3) What the percentages of impurities such as sand, weed growth, husks, and inert matter amount to.

(4) Whether noxious weed seeds are contained in the sample.

A note in addition is made of the ripeness of the seed, its size, and whether broken or not.

The purity test is carried out by separating the four lots described above, which are weighed; lots 2–4 being added together to give the amount of impurities present, and this is subtracted from the total weight of seed taken. The remainder (by weight) is known as the "percentage purity" of the sample. For accurate results a chemical balance and minute weights are essential. The weight of the sample taken for this test varies from ½ oz. in the smaller seeds to 8 oz. for very large and heavy seeds such as broad and runner beans. The separation described is best carried out on a sheet of white paper with a piece of flat zinc about 6 ins. in length, ½ in. broad at the end and tapering to about $\frac{1}{16}$ in. at the top.

The Germination Test.—Although comparatively simple, it requires minute care and constant observation in order to obtain a true and satisfactory result. First of all a quantity of seed true to name must be obtained, and from this three or four lots, each containing a hundred seeds, are counted out. In doing this a proportion of small, medium and big seeds are taken so that the sample is fully representative. Duplicate tests are invariably arranged in various ways on sand, flannel, filter-paper, blotting-paper, or other suitable materials. After the seeds are placed in the germination bed, they are either kept automatically moist, or a spray is systematically employed. Some seeds grow best in complete darkness, others prefer light or half-light, but there are so many influences which affect the germination test that it is undesirable to dogmatise on this question. The length of time in growth tests varies from ten days to three weeks or even longer.

Temperature is a most important item in all germination tests. As a general rule 20° C. (68° F.) is employed, while for some seeds it is advantageous to raise the temperature for several hours during the day to 30° C. (86° F.). Rapidity of germination is increased by this method. A constant and equitable temperature can be secured by placing the seeds in incubators heated by electricity and controlled by switches or thermostats, the latter being preferable and more reliable.

Estimated Value and Apparatus.—The real value of the sample is often estimated. This is expressed as the product of the purity and germination. Thus, assuming the purity of a seed is 95%, germinative capacity 90%, its true value is $\frac{95 \times 90}{100}$, or 85·5%. In other words, from every 100 lb. of such a parcel of seed only 85½ lb. could be expected to grow.

It is of the utmost importance to recollect that in the examination of seeds there will occur in some samples small imperfectly ripened and "weathered" grains; others may have a green tinge; some, instead of a plump exterior, are shrivelled and of different colour from the usual type. Again, certain of the seeds may be slightly injured by the machinery in the process of cleaning. The microscope here plays an important part in seed testing, and is invaluable to the seed analyst in arriving at certain conclusions.

The apparatus necessary in a well-equipped seed testing laboratory, public or private, is great and varied. Chemical Balances, Diaphanoscopes, Incubators of varying construction in size and shape, Tweezers, Sieves, Dissecting Sets, Separators, Porous Trays, and the materials for germination tests already mentioned, are the chief, in addition to which a thorough knowledge of botany and the problems of plant life is, of course, essential.

Home Testing of Seeds.—Apart from the scientific methods of seed testing already mentioned, there are many ways in which readers may easily test at home the vitality and purity of any seeds they buy. Vegetable and flower seeds may be grown on blotting-paper, folds of flannel and felt, or in pots of sand or garden soil. The method is simple: first of all a hundred seeds are counted out, and carefully placed on or in the selected material, after which this is thoroughly moistened and the receptacle is then transferred to a warm, dark place. A record is taken, say every two days, of the number of seeds which have germinated, the material meanwhile being kept uniformly moist. It should be noted that sand and earth tests are not so satisfactory, as the seeds cannot be observed during their development. It is necessary that the amount of light, air, water, and heat given should be tolerably even—especially is the amount of moisture supplied to the seeds of the utmost importance. The chief point to remember is not to give too much water, otherwise damping or rotting off will set in.

There are several other so-called methods of home testing of seeds, such as by immersing the seed in water or by planting it in a mixture of quicklime and soil. None of these are reliable and cannot be considered legitimate; they are indeed often misleading, so no good purpose would be served by describing them here.

M. H. F. S. of S. & S.

SEEDING AND TURFING.—See *LAWNS AND THEIR MANAGEMENT.*

SEEDLING RHODODENDRONS.—See under PROPAGATION in *RHODODENDRON.*

SEEDLINGS : MANAGEMENT OF.

The management of seedlings is not so easy as it sounds, and this many gardeners have found to their cost. It is quite easy to sow seeds, it is quite easy to set plants out in the garden, but it is not so easy to manage seedlings from the time they appear till the time they are ready for bedding out. Below are a few hints on this work, which it is hoped will prove useful to all gardeners.

Much can be done as a preliminary by using very light soil, and sowing the seeds of whatever kind they may be very thinly. This, and very shallow sowing, will largely prevent the common evil of hundreds of small spindly seedlings appearing. The soil used should, generally speaking, have at least one-eighth part of sand in it, and one-quarter of its own volume is better. It should not be dressed with artificial manures, as these do not tend to produce strong healthy seedlings. Seed when small should be sown absolutely on the surface of the soil, and the seed boxes covered with a sheet of glass and brown paper.

When the seedlings appear they must at once be put where they can get all the light possible. The ideal position for indoor plants is a shelf within a foot of the glass of a greenhouse; or should they be in a frame, the ideal position is within 6 ins. of the frame lights. Frequently ventilation is absolutely essential in the management of most seedlings, as otherwise damping off will set in, and spindly growth will be exceedingly common.

The watering of seedlings is a great problem to gardeners. However, the rule is that they should not have water unless the soil is getting dry. A clear ring of the seed-pans or pots will show that water is required, but a dull heavy sound when they are tapped with a wooden mallet shows that water is not required. The greatest error in the management of seedlings is to over-water them, since all manner of evils may set in if this is done.

Thorough drainage of seed-pots, pans, and boxes is essential if strong seedlings are to be the result. Sometimes as much as one-quarter of the total amount in the pans is drainage. Plenty of holes must be drilled in the bottom of the boxes if these are to be used for the rearing of seedlings, and these covered with crocks first. Then cover the crocks with the rougher portions of the compost, to prevent the finer soil particles from being washed down into the crocks.

Early pricking out is advisable if strong seedlings are to be the result. As soon as the little plants have two or four leaves they should be carefully lifted with a small trowel or hand-fork, and planted out separately in other boxes, or if they are of a hardy disposition into a bed in the cold frame. The distance to prick them out will depend on the nature of the plant, and in any case this should not be less than 3 ins. Six inches apart each way will be needed for the stronger bedding plants. The soil, again, should be very light, and planting should be firm. One good watering immediately after pricking out should carry the seedlings on for a considerable time.

The care of seedlings out of doors is somewhat similar to that just described. Seed should, of course, be sown very thinly, and the seed-bed should have reasonable and careful preparation. Not the hottest part of the garden should be chosen, but, instead, a plot which is very lightly shaded, in order that the seedlings may get a chance from the start instead of being burnt up by undue sun heat.

Out of doors there are, of course, many enemies to face, chief of which are slugs and snails. These creatures can be kept in abeyance by the free use of lime, or, better still, some good soil fumigant. For extra special seedlings the soil should be sterilised prior to planting, but this is usually too much trouble to be adopted largely. Watering of seedlings out of doors should not be done in hot sunshine, and should always be done with a very fine rosed can, to prevent the soil being washed away from the roots, or the plants being broken down by the shower from the rose. Warm water is better than icy cold water fresh from the tap.

Needless to say, throughout the seedling stage seed-beds should be kept scrupulously clean of weeds, as, if the plants have to fight a battle against weeds, they cannot be expected to form the sturdy stuff that they would do if they had not to contend with these enemies.

A word must be said in closing on the matter of feeding seedlings. Gardeners seem fond of giving the tiny plants patent fertilisers in large doses, and nothing could be less to their advantage. Providing that the soil is reasonably good, no artificial manures are in the least necessary, and harm will be the result if they are used. The only stimulant that can safely be applied is soot-water. All other fertilisers should not be used until the seedlings have ceased to be seedlings and become strong flowering plants or vegetables near to maturity.—E.

SELECTION.—See *HYBRIDISING AND CROSS-BREEDING.*

SELECTIVE ABSORPTION. — See *PLANT PHYSIOLOGY.*

SELENIPEDIUM.—See *ORCHIDS.*

SELF HEAL, or SELF-HEAL.—See *PRUNELLA*, also under PRUNELLA in *MEDICINAL HERBS.*

SELLIGUEA.—Now included in the genus GYMNOGRAMME, for which see *FERNS AND FERN GARDENING.*

SEMPERVIVUM (HOUSELEEK. Nat. Ord. Crassulaceæ). — This constitutes a most interesting genus of succulent plants, distinguished for their resistance to drought. Their thick, fleshy leaves are arranged in symmetrical rosettes, which are frequently of exquisite form and colouring. The greater number of those named are hardy, but in wet districts a few, especially those which have a charming cobweb-like tomentum on the rosettes, *e.g.*, *S. arachnoideum*, require protection by glass from excessive moisture in winter. If these are planted in a wall in an almost vertical position, this protection will be unnecessary, except in a few very wet parts of the country. The Houseleeks look well in chinks between dark rocks, but often harmonise perfectly with limestone. They flower more freely if there is lime in the soil, but this is not an entire gain, as the rosette which flowers dies afterwards. Some propagate themselves rapidly by means of little offsets, and are easily increased by taking off the side rosettes, which root quickly in light soil. They can also be raised from spring-sown seeds. The uses of Sempervivums in gardens are many and varied. Some have been employed with much skill in carpet bedding, their symmetrical form, neat habit, and simple formality lending themselves to the effects desired. They prefer a sunny situation and light soil. Some plant them with a proportion of decomposed manure in the soil, but others object to this as attracting birds in search of worms, and inducing them to tear up the rosettes. *S. Tectorum* is the common Houseleek frequently seen on roofs.

The nomenclature of the genus is in a chaotic condition, but the names which follow are founded on those of the best authorities. On account of the vast number in commerce, only a selection of the best and most distinct can be given.

SELECTION OF SORTS.

Sempervivum arachnoideum.—The COBWEB HOUSELEEK, with red flowers in June. Height, 4 ins. *S. a. barbulatum* has rose flowers. Six other good varieties bearing red flowers are *doellianum*, *Fauconetti*, *Hausmanni*, *Laggeri*, *piliferum*, and *webbianum*. Height, 4–8 ins.

S. arboreum.—A tender sort, with greenish-yellow flowers in July. Height, 6–9 ins. *S. a. atropurpureum* has purple foliage, and *S. a. variegatum* has foliage marbled cream.

S. arenarium.—Pale yellow flowers in June. Height, 6–9 ins.

S. arvernense.—Pink flowers in July. Height, 6–8 ins.

S. atlanticum.—Pale red flowers in July. Height, 1 ft.

S. Boisseri.—Red flowers in July. Height, 9 ins.

S. boutignyanum.—Rose flowers in July. Height, 8 ins.

S. Braunii.—Yellow flowers in July. Height, 6 ins.

S. calcareum (Syn. *S. californicum*).—Pale red flowers in July. Height, 10–12 ins.

S. canariense.—This is a greenhouse sort, with white flowers in June. Height, 1½ ft.

S. fimbriatum.—Red flowers in July. Height, 6–9 ins.

S. flagelliforme.—Red flowers in June. Height, 4 ins.

S. Funckii.—Red-purple flowers in July. Height, 6–9 ins.

S. glaucum.—Red flowers in July. Height, 6–12 ins. There are several varieties with little difference.

S. globiferum.—The HEN AND CHICKENS, with pale yellow flowers in July. Height, 3 ins. *S. g. soboliferum* is similar to the above.

S. hirtum.—Pale yellow flowers in June. Height, 6–9 ins.

S. metallicum.—This has metallic foliage, and red flowers in July. Height, 8–10 ins.

S. mettenianum.—Rosy-white flowers in July. Height, 4–8 ins.

S. montanum.—Red flowers in July. Height, 6 ins.

S. tabulaeforme.—A tender sort, with yellow flowers in June. Height, 12 ins. *S. t. variegatum* has variegated foliage.

S. Tectorum.—The COMMON HOUSELEEK, with red flowers in July. Height, 9–12 ins. The best varieties of this are *Lamottei*, *Reginae-Ameliae*, and *Requieni*.

S. triste.—A sort with dark foliage and red flowers in July. Height, 6–9 ins.—S. A.

SENEBIERA (Nat. Ord. Cruciferæ).

This is a genus of weedy plants of no garden value. Two species are sometimes offered. These, *S. Coronopus* and *S. pinnatifida* (Syn. *S. didyma*), are both popularly known as WART CRESS.

SENECILLIS.—Now included in the genus *SENECIO.*

SENECIO (Nat. Ord. Compositæ).

The Groundsels or Jacobaeas have considerable garden value, but it is to the perennial border and the greenhouse species that we look especially for stately form and brilliant colouring. Nevertheless, and notwithstanding its ubiquitous relative the common wild Groundsel, there is at least one useful garden plant which is a hardy annual, namely, *Senecio elegans*. It was formerly used extensively as a bedding plant, and it is useful for this purpose because it continues to bloom all through the season provided plants are raised under glass in March and planted out in early May, 6 ins. apart each way. An outdoor sowing in April will give plants to flower in late summer and autumn. The double form is far superior to the single, and the colours obtainable are white, through pink, salmon, and carmine, to purple and crimson. The height varies considerably, 9–18 ins. being the average.

Greenhouse Species.—These are numerous. They succeed under cool greenhouse treatment in light sandy loam and are preferably increased by cuttings. The following are a few of the best:—

Senecio ***argutus.*** — This bears yellow flowers about July. Height, 3 ft.

S. ***cruentus.*** — See article on *CINERARIA.*

S. ***fulgens.***—This is a scarlet summer blooming sort about 2 ft. high.

S. ***grandiflorus*** (Syn. *S.* ***venustus***).—This bears purple flowers from August onwards, and grows 1½ ft. high.

S. ***lilacinus.***—This bears lilac and blue flowers from June onwards. Height nearly 2 yds.

S. ***macroglossus.***—This is a yellow-flowered climber blooming in July. Height, 6–10 ft.

S. ***persicifolius.***—This is a purple-flowered sort blooming in July. Height about 1 yd.

S. ***pubigerus.***—This bears reddish flowers from mid-summer onwards. Height, 2 ft.

S. ***rosmarinifolius.*** — This bears yellow flowers in July. Height about 1 yd.

S. ***venustus.***—Syn. *S.* ***grandiflorus.***

Perennial Border Species.—These include some of the most attractive garden plants. They succeed with ordinary treatment for perennials in good soil in a sunny or lightly shaded site, are propagated by division of the roots in the autumn or spring, and may be successfully planted any time from November to March. We describe a few of the best species below:—

Senecio ***adonidifolius*** (Syn. *S.* ***artemisiaefolius***).—This is a useful yellow sort, flowering from July onwards, and growing about 12 ins. high.

S. ***alpinus.***—This also is yellow and is suitable alike for rock garden and border. It blooms from June onwards and grows 18 ins. high.

S. ***artemisiaefolius.***—Syn. *S.* ***adonidifolius***, which see.

S. ***carniolicus*** —This bears yellow flowers freely in the summer, and varies somewhat in height.

S. ***Cineraria*** (Syn. ***Cineraria maritima***). — This, the DUSTY MILLER of popular gardens, bears yellow flowers freely from July to September, and averages about 2 ft. in height.

S. ***Clivorum.***—This, so often offered by nurserymen, is not grown at Kew. It may be synonymous with *S.* ***japonicus***, described below.

S. ***Doria.***—This useful species bears yellow flowers in August, and averages about 4 ft. high.

S. ***Doronicum*** (LEOPARD'S BANE).—This is hardly distinct from ***Doronicum austriacum.*** It bears attractive yellow flowers in the spring and summer, and averages 1–3 ft. high.

S. ***Ewersii.***—Syn. *S.* ***alpinus***, which see.

S. ***jacquemontianus.***—According to some authorities this is a synonym of *S.* ***nemorensis*** (described below). It is undoubtedly very similar to it.

S. ***japonicus.***—This useful species bears yellow flowers in August, and averages about 1 ft. in height. The variety ***macrantha*** is specially good.

S. ***macrophyllus.*** — This useful taller species bears yellow flowers from July onwards, and averages 4 ft. in height.

S. ***nemorensis.***—This bears yellow flowers from July onwards, and averages about 1 yd. in height.

S. paludosus (BIRD'S TONGUE).—This native species bears yellow flowers from July onwards, and averages 5 ft. high.

S. pulcher.—This bears attractive crimson-purple or yellowish-purple blooms in July, August, and September. Its height is about 1 yd.

S. sarracenicus (SARACEN'S CONSOUND).—This, which requires a damp site, bears yellow flowers from July onwards, and averages about 4 ft. high.

S. Smithii.—This is an attractive sort bearing pink flowers from July onwards. It grows about 2 ft. high.

S. uniflorus.—This dwarf sort is useful in the rock garden. It bears yellow flowers in July, and averages 3 ins. in height.

See also *SHRUBS.*

SENSITIVE FERN (*Onoclea sensibilis*). See *FERNS AND FERN GARDENING.*

SEQUOIA.—For the best species see *TREES.*

SERBIAN SPRUCE.—The same as SERVIAN SPRUCE.

SERIOLA.—Now included in the genus *HYPOCHOERIS.*

SERRADELLA (*Ornithopus sativus*). See *ORNITHOPUS.*

SERRAFALCUS.—Now included in the genus *BROMUS.*

SERRATULA (SAW-WORT. Nat. Ord. Compositæ).—Former species of this genus are now included under *Jurinea*, *Liatris*, and *Saussurea*, but we only mention the last two genera. Omitting the synonymous species, we are left with a number of annuals, biennials, and hardy perennials, but only the last section are worthy of much attention. These are of easy culture in ordinary soil and may be grown much as any other hardy herbaceous perennials, being planted in March, and propagated by root division or by seeds at the usual times. *S. coronata*, *S. heterophylla*, and *S. quinquefolia* are the three best species, bearing purple flowers in July, on plants 2–6 ft. high. *S. tinctoria* is the COMMON SAW-WORT —a plant of little merit. The type and its variety *monticola* both bear purple flowers from July to August, and grow 2–3 ft. in height.

SERVIAN SPRUCE (*Picea Omorica*). See *TREES.*

SERVICE-BERRY (*Amelanchier canadensis*).—See *SHRUBS.*

SERVICE TREE (*Pyrus Sorbus*).—See *TREES.*

SESELI (MEADOW SAXIFRAGE. Nat. Ord. Umbelliferæ).—This is a genus of hardy annuals, biennials, and perennials of no value in the ordinary garden, but often offered to and bought by unwary amateurs on account of its English name containing the word "Saxifrage." All bear white flowers about July, and average 1½–4½ ft. in height. *S. annuum* and *S. Hippomarathrum* are probably the best known species, the latter being the HORSE FENNEL.

SESLERIA (Nat. Ord. Gramineæ). This is a genus of coarse-growing grasses, hardy perennials of no value in the garden whatever. *S. argentea* (Syns. *S. cylindrica* and *S. elongata*) and *S. coerulea* are probably the best known species; the latter is the MOOR GRASS so familiar to ramblers.

SETARIA (BRISTLY FOXTAIL GRASS. Nat. Ord. Gramineæ).—This is a genus of hardy annual grasses of little value, which thrive in almost any kind of soil. *S. viridis*, the BOTTLE GRASS, growing 1–2 ft. high, is about the best. *S. italica*, popularly known as ITALIAN MILLET (not so tall), must be distinguished from the MILLET described in our article on *PANICUM*, and from the MILLET GRASSES mentioned in our articles on *MILIUM* and *SORGHUM.*

SEWAGE AS MANURE.

The recovery and utilisation of the fertilising properties of sewage have occupied much attention, especially since the establishment of special works for purifying the sewage of towns. Many calculations have been made of the loss of nitrogen and other products contained in sewage, and numerous attempts have been made to recover the manurial constituents. It must, however, be borne in mind that a large proportion of the fertilising value of sewage is contained in the liquid portion, and cannot be extracted economically, except where land can be irrigated directly with the liquid.

The solid deposited residues or sludges are therefore the only portion of sewage which can at present be usefully employed as manures on any extensive scale. Such sludges vary in character according to the system of treatment employed for the purification of the sewage.

Usually the heavier solids are first separated by allowing them to deposit in special tanks or catch-pits. This deposit is frequently of considerable manurial value, especially when deposited in dry weather, as it contains, in many cases, pieces of fœcal matter, offal, manure washed from roads, and similar substances. Where there is not objection to a manure having an unpleasant smell during its application to the land, this material provides a useful substitute for farmyard manure. If collected during wet periods it is liable to contain an excessive quantity of sand and grit washed from the roads.

The lighter solids in sewage, forming the largest bulk, are usually separated either by simple deposition in tanks, or by the addition of chemical precipitants such as lime, salts of iron, or alumina. The salts of iron and alumina commonly used as precipitants are sulphates and chlorides of iron, and the sulphate of alumina. Alumino-ferric, which is largely used for the purpose, is a mixture of crude ferric sulphate and alumina.

The sludges formed, when merely dried in the air remain pasty in character for a long period. In some cases the moisture is partially removed by compression in filter presses, usually after the addition of lime, and the sludge is then obtained in the form of "pressed cake" or "sludge cake." This material, when allowed to weather in the air for a few months, has the appearance of a rich loam, and is in a very suitable condition for application to land. It is practically odourless. Apply about 1 ton of it to each 300 sq. yds. of land.

Such manures may be properly applied in the autumn or early spring. Owing to the low potash content of sewage manures it is advisable, where possible, to apply a dressing of a potash salt with manure to land on which potash-loving crops are to be grown. A quantity of a potash salt or flue dust, equivalent to 2–3 lb. of potash per ton of manure would be suitable. Lime should, of course, be present in sufficient quantity, but where lime is used in the precipitation or pressing of the product, there is usually no deficiency of this constituent.

An objection frequently raised to the use of sewage manures is the presence of various seeds derived from kitchen wastes, and washed from gardens, roads, etc., into the sewers. If, however, the manure is allowed to stand in heaps for some time, this difficulty is usually removed by reason of such seeds becoming rotted.

A further and real objection to sewage manures produced particularly in towns where textile industries are common, is the presence of grease or fats. In some cases the grease is recovered, and the resulting sludge is said to be "degreased." It is, however, frequently found that sludges still contain more grease than is present in the products of towns or villages where no such industries exist. If such products are shaken with a little ether or petroleum spirit, and the settled spirit is decanted and allowed to evaporate, a residue of grease will be left behind, if present.

The value of sewage as a true fertiliser, in the restricted sense, is not, however, so great as might be supposed, but it may be usefully employed where it can be placed on the land at a cheap rate or during a scarcity of other manures. A Royal Commission on Sewage Disposal made elaborate investigations on the manurial value of sewage sludges, and found that at that time, viz., in the year 1908, the sludges experimented upon would not have a value exceeding 10s. per ton.

Sewage sludges vary greatly in composition, by reason of variation in the sewage and in the modes of treatment. They are usually somewhat deficient in potash.

The following analysis may be taken as typical of a prepared and dried sludge from a town sewage in which lime has been used as a precipitant:—

	Per cent.
Phosphate of Lime	1·22
Sulphate of Lime	1·45
Carbonate of Lime (variable)	38·86
Carbonate of Magnesia	1·33
Hydrate of Magnesia	1·42
Oxide of Iron	3·55
Alumina	10·64
Silica	13·75
Organic Matter[1]	23·78
Water at 100° C.	4·32

Many patent manures derived from sewage sludges have been placed on the market from time to time, at prices exorbitantly in excess of their manurial values. Such products should only be purchased on analysis, and with a guarantee of their composition.

Sewage manures, in common with other artificial fertilisers, are most usefully and conveniently applied when dried, and in the form of a finely divided powder. It is probable that a slight loss of nitrogen in the form of ammonia occurs in the drying process, but there are corresponding advantages in the matter of transport, application, and storage.

It may be asked what vegetables sewage manures are specially suitable for, so it may be useful to record here that Beet, Cabbage, Carrots, Celery, Kohl Rabi, Leeks, Onions, Parsnips, Potatoes, Salsafy, Tomatoes, and Turnips have been grown with great success on land treated with sewage manures.

At the present time an improved method of dealing with sewage by bacteriological action is being developed, which gives promise of yielding a fertiliser described as "Activated Sludge," much richer in nitrogen and phosphoric acid than ordinary sludges. This process is, however, still in its experimental stage, satisfactory means for preparing and drying this material in bulk not having yet been developed.

A note of warning should be added in respect of the use of so-called manures taken from household ashpits. Such products have little, if any, manurial value, and the presence of partially burnt coal and ashes renders them distinctly objectionable for application to the soil.

JNO. H.

---

[1] Nitrogen, 0·70 per cent.; equal to Ammonia, 0·85 per cent.

SHADE: PLANTS AND SHRUBS FOR.—See *SHADY BORDERS.*

SHADE: ROCK PLANTS FOR.—See ROCK PLANTS FOR SHADE in *ROCK PLANTS FOR ALL PURPOSES.*

SHADY BORDERS: PLANTS AND SHRUBS FOR.—Some plants and shrubs will grow and flower better, naturally, in shady places than in those directly exposed to the sun; but many more will thrive in such positions than is usually realised. The worst place to deal with is directly under trees. Dense shade and drip are two opposing factors to be reckoned with here, when considering successful gardening; but still, a good measure of satisfaction can be attained with a little wise forethought.

Thorough preparation of the ground and the careful choice of subjects are the two secrets of success, especially in the case of plants under trees, whose roots soon rob the soil of its food to the detriment of smaller plants and shrubs. Indeed this robbery goes on seriously where borders are shaded by the close proximity of trees, while not necessarily under the trees. In both cases the remedy is the same,—the soil must be liberally enriched to give the subjects a chance of becoming established. Once the plants are "at home," future assistance is best given by mulching or top-dressing. Success under trees will be the better guaranteed if all low branches can be removed from the trunks.

It must not be thought that all plants and shrubs recommended will please in every instance. They will not; experience alone will show which are to be relied upon in any given locality. Cultivation may have been of the highest, and yet plants in identical sites, but in different districts, flourish in one and die or languish in the other. And why? Mostly, we are convinced, because of the variableness of soils. Generally speaking, better results can be expected from light soils in shady situations than from heavy soils similarly placed. In fact plants advised usually for shade should be grown in the open if the soil be of a clayey disposition. One grand exception to this rule is found in Daffodils.

Having already mentioned that other plants will do in shade, or partial shade, besides those popularly associated with these positions, it need only be added tha such conscripted subjects will not yield the same quality flowers as those in open positions and, of course, will be later in flowering.

Suitable Subjects for Shade.—A good selection of plants and shrubs suitable for shady places is the following — those followed by an asterisk being the better to use under trees:—

Acanthus.
Aconites (winter).*
Aconitum.
Amelanchier canadensis.
Anemone (in var.).
Aquilegia.
Asperula.
Astilbe.
Azaleas (hardy).
Bamboos.
Berberis Aquifolium.*
Calceolaria.
Campanula (in variety).
Chamaerops.
Clethra.
Colchicum.*
Corydalis.
Crocus.*
Cyclamen (hdy.).*
Cypripedium spectabile.
Daffodils.*
Deutzia.
Dicentra spectabilis.
Digitalis.*
Dipsacus.
Dodecatheon.
Doronicum.
Epimedium.
Eranthis.
Erythronium.
Euphorbia.*
Ferns.*
Fuchsia.
Funkia.
Gaultheria.
Gentiana asclepiadea.
Heliotrope.
Helleborus.
Hemerocallis.
Hepatica.
Holly.*
Hoteia.
Hyacinth (Common Bluebell).
Hydrangea.
Iberis (Perennial Candytuft).
Iris (some of the non-bulbous).
Ivies.*
Juniper.*
Leucojum.*
Liliums (partial shade).
Lily of the Valley.
Lunaria.

Lupine.
Lysimachia.*
Mimulus luteus (shade and damp).
Myosotis.
Œnothera.
Olearia Haastii.
Orchis (shade and damp).
Oxalis.
Paeony.
Papaver.
Petasites.*
Polygonum.*
Primula.
Rhododendrons.
Ribes.
Rudbeckia speciosa.
Ruscus aculeatus.*
Saxifrages (mossy).
Scilla.
Senecio.
Solomon's Seal.*
Spiraea.
Thalictrum.
Trillium.*
Trollius.
Veronicas (shrubby).
Viburnum.
Vinca.*
Viola.—C. T.

[See also the article on *North Borders*.—Editor.]

SHADY LAWNS.—See *Lawns and their Management.*

SHAGGY CAPS.—See Edible Fungi in *Fungi: Edible and Harmful.*

SHALLON (*Gaultheria Shallon*).—See *Shrubs.*

SHALLOT.—See *Medicinal Herbs* and *Shallots.*

SHALLOTS (*Allium ascalonicum.* Nat. Ord. Liliaceæ).—These are certainly one of the best paying crops now largely cultivated by kitchen-gardeners and allotment-holders. Those who do not share this opinion can hardly have given the crop the liberal treatment it certainly deserves.

Culture.—A good rich bed should always be provided, and the earlier this is prepared in the winter, the better it will be. Plant any time from December 21st until the middle of March, in rows 9–12 ins. apart, allowing about 9 ins. between the sets. In planting, make no attempt to bury the bulbs, or "cloves" as they are often called, but simply push them far enough into the soil to prevent strong wind displacing them before they get well rooted. During May and June, use manure water, or one of the advertised manures, freely between the rows, and keep the soil stirred with the hoe.

In ordinary seasons the crop is ready for lifting early in July, the withered tops showing when this stage is reached. After lifting, allow the crop to get thoroughly dry by full exposure to the sun. Store in a dry room for winter use. Bulbs may also be raised from seed sown in the open during March, but the above is the most satisfactory and most generally adopted plan.

Several varieties are found in seed-lists, but *Dobbie's Exhibition* or *Russian Giant* are double the size of the ordinary.—F. R. C.

SHAMROCK (*Trifolium dubium*).—See *Trifolium.*

SHAPE OF BEDS.—See *Beds: Shape and Character of.*

SHASTA DAISY (*Chrysanthemum maximum*).—See *Chrysanthemum: Perennial Border Species.*

SHAVINGS MANURE.—See under Wood Shavings Manure in *Horse Manure.*

SHAWANESE SALAD (*Hydrophyllum virginicum*).—See *Hydrophyllum.*

SHEARS.—See *Garden Tools.*

SHEEP LAUREL (*Kalmia angustifolia*).—See *Shrubs.*

SHEEP MANURE.

Sheep are often put to graze in cricket or football fields, and a large quantity of their manure accumulates, as, of course, the dung has to be swept up before the ground can be played on. Gardeners do not seem to have realised the value of this manure, or the heaps of it which one sees as above mentioned would be quickly disposed of.

Sheep dung is a hot fermenting sulphurous solid, not highly charged with water as are cow and pig manure. It is very suitable for digging into clay soils after it has decomposed in a protected heap for about a month, and may be used at the rate of 2–4 cwt. per sq. rod, according to the richness of the land.

Goat Manure.—This is coming to the front a good deal on account of the increase of goat-keeping. It resembles sheep manure in its general properties, and may be used in the same manner.—E.

SHEEP POISON (*Lupinus densiflorus*). See *LUPINE*.

SHEEP SORREL (*Rumex Acetosella*). See *RUMEX*.

SHEEP'S-BIT SCABIOUS.—A name applied to the genus *JASIONE*, which see.

SHEEP'S FESCUE (*Festuca ovina*).—See *FESTUCA*.

SHEEP'S SCABIOUS.—A name applied to the genus *JASIONE*, which see.

SHELL-BARK HICKORY (*Carya alba*). See *TREES*.

SHELLS.—See *FISH AS MANURE*.

SHELTERS.

These are very necessary if the garden is extensive, as April showers, though soon over, are very wetting. Shelters may either take the form of ARBOURS (see article on *ARBOURS AND ARCHES*) or SUMMER-HOUSES (see article on *GARDEN SUMMER-HOUSE*). In either case the roof should be sufficiently well made to ensure complete protection from the heaviest rain. A garden seat or two might well be kept in such shelters so that one can rest from one's labours till the rain ceases.

SHEPHERD'S NEEDLE. — See *SCANDIX*.

SHEPHERD'S PURSE.—See *CAPSELLA* and *WEEDS*.

SHEPHERD'S ROD (*Dipsacus pilosus*).—See *DIPSACUS*.

SHEPHERDIA.—For the best species see *SHRUBS*.

SHERARDIA.—See *FIELD MADDER*.

SHINGLE OAK (*Quercus imbricaria*). See *TREES*.

SHINING PINK (*Dianthus nitidus*). — See *DIANTHUS*.

SHINING WILLOW (*Salix lucida*).—See *TREES*.

SHIRLEY POPPIES.—See *POPPIES: ANNUAL SPECIES*.

SHODDY AS MANURE. — See "Waste Hair" in our notes on ORGANIC PRODUCTS under NITROGENOUS MANURES in *MANURES*.

SHOE-STRINGS (*Amorpha canescens*). See *SHRUBS*.

SHOOT AND FRUIT CURRANT MOTH.—See *INSECT PESTS*.

SHOOTING STARS.—A name applied to the genus *DODECATHEON*.

SHORE-WEED.—See *LITTORELLA*.

SHORT-STEMMED FLOWERS.—See *FLOWERS UNSUITABLE FOR CUTTING*.

SHORTHORN CARROTS. — See *CARROT*.

SHORTIA (CRIMSON LEAF. Nat. Ord. Diapensiaceæ).—This is a somewhat remarkable genus of only two species, one of which is found in North America and the other in Japan. Both are shade-loving plants, and require a cool, moist, but well-drained position in sandy loam and peat. They are propagated by careful division in spring.

S. galacifolia.—This bears tufts of glossy leaves which are tinted crimson in the autumn. Flowers white, changing to rose with age. Flowering Period, May to June. Height, 6 ins.

S. uniflora.—This has smaller leaves in tufts. Flowers pale rose. Flowering Period, May to June. Height, 4 ins. The variety *grandiflora* bears larger flowers, which are deeper in colour.

SHOVELS.—See *GARDEN TOOLS*.

SHOW AURICULAS.—See *AURICULA*.

SHOW DAHLIAS. — See *DAHLIA: CULTURE OF*.

SHOWY LILY TREE (*Magnolia conspicua*).—See *CLIMBING AND TRAILING PLANTS*.

SHRIMP REFUSE.—See *FISH AS MANURE*.

SHRUB BANKS.—See *BANKS.*

SHRUB BORDERS: Top-dressing for.—See *TOP-DRESSING.*

SHRUBBERIES: Herbaceous Plants for.—Any of the coarser-growing and stronger hardy perennials are eminently suitable for the borders which so often form the margins to shrubberies, provided these borders get a reasonable amount of sun. It is needless to give a list of suitable subjects here, since even the veriest amateur will be able to think of plenty of suitable subjects without the least difficulty. In the articles on the plants themselves care has been taken to mention a few of these species instead of omitting them entirely, and usually the reader's attention is specially drawn to the fact that the species is more suitable for the shrub border than for the perennial parterre.

SHRUBBERIES: Management of.

A well-arranged and carefully tended Shrubbery is one of the finest features of a well-managed garden, but unfortunately this is but seldom met with. Bad selections of kinds, much too close planting, and the introduction of tall-growing trees are in most cases the main causes of failure.

In laying out a shrubbery it is essential that the habits of the various plants be fully understood, and then a proper arrangement can be planned and carefully carried out. It must never be forgotten that it is but a few kinds of shrubs that can be got to thrive under trees, so the site chosen must be open and sunny for the great bulk of ornamental bushes, whether grown for their flowers or foliage.

When first laying out a shrubbery the tendency is to plant much too closely together, for the sake of immediate effect, and although most of us have this weakness, it cannot be too strongly condemned, unless arrangements are made to thin out rigorously before over-crowding has spoiled the symmetry of the different plants. One is not always able, because of the want of space, to plant each species by itself, but where at all possible this method is to be commended, as it not only makes it much easier to provide suitable soil for each, but the subsequent treatment is much simplified, and in most cases the effect is very pleasing. Even in quite a small shrubbery, clumps of half a dozen or so of each kind chosen, will give better results than an indiscriminate mixture of a large number of species. If carefully done, the planting or transplanting of shrubs may be successfully carried out from September to May, but October and November, and February and March for the general run of shrubs, may be said to be the most favourable times, with April or early May for hybrid rhododendrons and hollies. When planted in late spring, and a dry summer follows, copious watering will be a necessity.

In preparing the ground for shrubs of all kinds, it is advisable first to trench or double-dig it, working in some vegetable mould, or such like, if the soil is at all poor.

In the case of Azaleas, Heaths, Kalmias, Rhododendrons, and other peat-loving subjects, where procurable, a large amount of fibrous peat should be added to the soil, but all the same, grand results are had on moist, clayey loams with these plants, without such admixture. Care must always be taken to exclude lime in any form from the soil in which these peat-lovers are planted.

After a time it not infrequently

happens that shrubs of various kinds begin to show signs of exhaustion. Many people believe that such plants cannot be brought back to health and vigour, and yet this is easily accomplished by a generous application of well-rotted farmyard manure. This may be applied merely as a mulch, or lightly forked into the surface, taking care not to damage the roots. Even where no manuring is necessary, the surface of the ground should be lightly forked over every winter, and during the summer frequently hoed, not only for the sake of tidiness but also as an aid to the plants.

The question of pruning is one of the great stumbling-blocks in connection with the culture of shrubs to many gardeners, and not infrequently all are allowed to grow as they choose, and so very often get out of shape and become an eyesore.

All the commoner kinds that are grown for their foliage alone may, speaking generally, be pruned during the winter months, but flowering kinds should usually be treated just after the flowers fade. In the case of the latter, of course, few of them really require pruning in the accepted sense of the word, but the shortening back of a straggly growth here and there is often a decided benefit. In the case of Deutzias, Lilacs, and others of this nature, some of the old wood should be cut clean out, so as to encourage the growth of strong young shoots for future blooming. (See *PRUNING ROSES AND SHRUBS.*)

The removal of all faded flowers and seed-pods from Azaleas, Rhododendrons, etc., is a distinct benefit to the plants, besides adding materially to the appearance of the shrubbery. Remove annually all dead branches and all suckers from grafted bushes.—C. B.

SHRUBBY CLIMBERS.—See *CLIMBING AND TRAILING PLANTS.*

SHRUBBY WISTARIA (*Wistaria frutescens*). — See *CLIMBING AND TRAILING PLANTS.*

SHRUBS.

It is obviously impossible to describe the thousands of species and varieties of shrubs now available to the gardener. The limited space at our command will prevent this, and, except for giving short articles on *EVERGREENS*, *FLOWERING SHRUBS*, *RHODODENDRONS*, and a few others, we are contenting ourselves with giving the list below, which comprises all the best shrubs for the garden of the amateur. Unless definitely stated to the contrary, all the shrubs are hardy in the average climate of the British Isles. Evergreen species are marked *E.*, and those which are tender or half-hardy are marked *H.H.E.*, in the case of the evergreen, and *H.H.D.* for the tender or half-hardy deciduous kinds. Species not marked with any initials are deciduous. For full descriptions and further cultural details the reader must consult larger works, and he should read nurserymen's catalogues for the numerous varieties in commerce. It may be said, however, that those named will generally thrive in ordinary garden soil, lightened if heavy by the addition of some leaf-soil. The names given are those recognised at Kew, and synonyms are in most cases omitted, as they are in many instances very confused and too numerous. Climbers are not included in the list below, but they will be found dealt with in our article on *CLIMBING AND TRAILING PLANTS.* Subjects specially suitable for use as Foliage Plants will be found in our article on *FOLIAGE PLANTS FOR ALL PURPOSES.*—EDITOR.

Select List of Garden Shrubs.

ABELIA.

A. chinensis.—The Rock Abelia, with pink flowers in August and September. Height, 2–3 ft.

A. floribunda (*E.*). — Rosy purple flowers in March. Height, 3 ft.

A. spathulata (*H.H.E.*). — Pink flowers in April. Height, 2–3 ft.

A. triflora (*H.H.E.*).—Yellow and pink flowers in September. Height, 6 ft.

ABUTILON. See also separate article and article on *Climbing and Trailing Plants.*

A. vitifolium. — Lilac flowers in June. Height, 10 ft.

ADENOCARPUS.

A. decorticans (*H.H.E.*).—Yellow flowers in May. Height, 3 ft.

ÆGLE. Bengal Quince or Hardy Orange.

Æ. sepiaria (*E.*).—White flowers in April. Height, 4–10 ft.

AMELANCHIER. June Berry.

A. alnifolia.—The Dwarf June Berry, with white flowers in April. Height, 8 ft.

A. canadensis.—The June Berry or Service-berry, with white flowers in April. Height, 8–10 ft.

A. vulgaris.—The Common Amelanchier, with white flowers in April. Height, 8–16 ft.

AMORPHA. Lead Plant.

A. canescens.—The Lead Plant and Shoe-strings, with dull-blue flowers in July. Height, 3 ft.

A. fruticosa in variety.—The False Indigo, with purple flowers in June. Height, 6 ft.

ANDROMEDA.

A. polifolia (*E.*). — The Wild Rosemary, with pinkish-white flowers in June. Height, 1 ft.

ARALIA.

A. cachemirica.—White flowers in July. Height, 6–10 ft.

A. chinensis. — White flowers in August. Height, 10 ft.

A. spinosa.—The Angelica Tree and Hercules' Club, with white flowers in August. Height, 3–10 ft.

ARBUTUS. Strawberry Tree.

A. Andrachne (*E.*).—Greenish-white flowers in March and April. Height, 8–10 ft.

A. hybrida (*H.H.E.*). — White flowers from September onwards. Height, 8–10 ft.

A. Menziesii (*E.*).—The Madroño with white flowers in September, Height, 10 ft.

A. Unedo in variety (*H.H.E.*).—The Strawberry Tree, with white to red flowers in September. Height, 6–10 ft.

ARCTOSTAPHYLOS. Bearberry.

A. alpina (*E.*).—The Black Bearberry, with white or pink flowers in April. Height, 1 ft.

A. tomentosa (*E.*).—The Manzanita, with white flowers in November. Height, 4 ft.

A. Uva-ursi (*E.*).—The Bearberry, with white flowers in April. Trailer.

ARTEMISIA. Mugwort, Southernwood, and Wormwood. See also separate article.

A. Abrotanum (*E.*). — The well-known Southernwood, with yellowish flowers from August to October. Height, 1–4 ft. (See also Southernwood in article on *Medicinal Herbs.*)

A. Absinthium (*E.*). — The well-known Wormwood, with yellow flowers. Height, 1–2 ft. (See also Wormwood in article on *Medicinal Herbs.*)

A. coerulescens (*E.*).—Yellow flowers in August. Height, 2 ft.

A. procera (*E.*).—The Sage-bush, with yellow flowers in August. Height, 1–2 ft.

A. tridentata (*E.*).—Yellow flowers in August. Height, 1–10 ft.

ASTRAGALUS. Milk Vetch. See also separate article.

A. Tragacantha (*E.*).—The Gum Tragacanth, with violet flowers in June. Height, 1–3 ft.

AUCUBA.

A. japonica in variety. (*E.*).—A foliage plant. Height, 4–10 ft.

AZALEA. See separate article.

AZARA.

A. Gilliesii (*E.*).—Yellow flowers in May. Height, 10 ft.

A. microphylla (*E.*). — Greenish flowers in August. Height, 6–12 ft.

BERBERIDOPSIS. See article on *Climbing and Trailing Plants.*

BERBERIS. Barberry.

B. Aquifolium, Syn. *Mahonia Aquifolium* (*E.*).—The Mahonia, with yellow flowers in March. Height, 2–6 ft.

B. aristata.—Yellow flowers in April. Height, 6 ft.

B. buxifolia (*E.*).—Yellow flowers from March to April. Height, 8 ft.

B. buxifolia nana (*E.*). — Yellow flowers in March. Height, 1½ ft.

B. canadensis.—The American Barberry, with yellow flowers from May onwards. Height, 6 ft.

B. Darwinii (*E.*).—Yellow flowers in May. Height, 8 ft.

B. dictyophylla.—Yellow flowers from May onwards. Height, 1–2 ft.

B. empetrifolia (*E.*).—Yellow flowers in May. Height, 1–2 ft.

B. Gagnepainii (*E.*).—Yellow flowers in May. Height, 3–6 ft.

B. japonica (*E.*).—Yellow flowers in May. Height, 6 ft.

B. Knightii (*E.*).—Yellow flowers in May. Height, 3–6 ft.

B. laevis.—Yellow flowers in May. Height, 3–4 ft.

B. pinnata.—Yellow flowers in May. Height, 3–10 ft.

B. pruinosa.—Yellow flowers from April onwards. Height, 3–6 ft.

B. sargentiana (*E.*).—Yellow flowers from May onwards. Height, 3–6 ft.

B. stenophylla in variety (*E.*).—Yellow flowers in May. Height, 3–8 ft.

B. Thunbergii.—Yellow flowers from April onwards. Height, 2–6 ft.

B. vulgaris in variety.—The Barberry or Common Barberry, with yellow flowers in April. Height, 3–20 ft.

B. wallichiana (*E.*).—Yellow flowers in April. Height, 6–10 ft.

B. Wilsoni.—Yellow flowers in May. Height, 2–4 ft.

BRYANTHUS.

B. erectus (*E.*).—Purple flowers in April. Height, 1 ft.

BUDDLEIA. See also article on *Climbing and Trailing Plants*.

B. albiflora.—White flowers in July. Height, 6–8 ft.

B. Colvillei (*H.H.E.*).—Deep rose flowers in July. Height, 10–20 ft.

B. globosa (*H.H.E.*).—The Orange Ball Tree, with orange flowers in July. Height, 6–12 ft.

B. variabilis in variety, with purple or lilac flowers in July. Height, 8–15 ft.

BUPLEURUM. Hare's Ear.

B. fruticosum (*E.*).—Yellow flowers in August. Height, 1–2 ft.

BUXUS. Box.

B. balearica (*E.*).—The Minorca Box. A foliage plant. Height, 6–8 ft.

B. Fortunei (*E.*).—A foliage plant. Height, 4–8 ft.

B. sempervirens in variety (*E.*).—The Silver Box. A foliage plant. Height, 1–20 ft.

B. sempervirens suffruticosa (*E.*).—This is the form used for edgings, and popularly known as Edging Box.

CAESALPINIA. Brasilleto.

C. sepiaria.—Yellow flowers in May. Height, 6 ft.

CALLUNA. Heath, Heather, or Ling. See also article on *Heaths*.

C. vulgaris in variety (*E.*).—The Common Heather or Ling, with purple to white flowers in August. Height, 1 ft.

CALYCANTHUS. Allspice.

C. floridus.—The Carolina Allspice, with purple flowers in May. Height, 4 ft.

C. occidentalis.—The Californian or Western Allspice, with red flowers from June onwards. Height, 6–8 ft.

CAMELLIA. See also separate article.

C. japonica in variety (*H.H.E.*).—White to crimson flowers from March onwards. Height, 6–15 ft.

CARAGANA. Pea Tree.

C. arborescens.—The Siberian Pea Tree, with yellow flowers from April onwards. Height, 8–10 ft.

CARPENTARIA.

C. californica (*H.H.E.*). — White flowers from May onwards. Height, 6–10 ft.

CASSANDRA.

C. calyculata (*E.*).—The Leather-leaf, with white flowers in May. Height, 2 ft.

CASSINIA.

C. fulvida, with white flowers in July. Height, 4 ft.

CEANOTHUS. See also article on *Climbing and Trailing Plants*.

C. americanus (*E.*). — The New Jersey Tea, with white flowers from June onwards. Height 2–8 ft.

C. azureus in variety (*H.H.E.*).—Blue flowers from June onwards. Height, 5–10 ft.

C. dentatus (*H.H.E.*).—Blue flowers from May onwards. Height, 6 ft.

C. divaricatus (*H.H.E.*). — Blue flowers from May onwards. Height, 6 ft.

C. thyrsiflorus (*H.H.E.*). — The California Lilac, with blue flowers in May. Height, 8–10 ft.

C. veitchianus (*H.H.E.*). — Blue flowers from May onwards. Height, 6–8 ft.

CHIMONANTHUS. Winter Sweet.

C. fragrans.—White and purple

flowers from November onwards. Height, 6 ft.

CHIONANTHUS. Fringe Tree.

C. virginica.—White flowers in May. Height, 6–15 ft.

CHOISYA. Mexican Orange Flower.

C. ternata (*E.*).—White flowers from May onwards. Height, 6–10 ft.

CISTUS. Rock Rose. See also article on *Climbing and Trailing Plants.*

C. crispus (*H.H.E.*).—Purple flowers in June. Height, 2 ft.

C. cyprius (*H.H.E.*).—White flowers in June. Height, 4 ft.

C. florentinus (*H.H.E.*). — White flowers in June. Height, 4 ft.

C. ladaniferus (*H.H.E.*).—The Gum Cistus, with white flowers in June. Height, 4–6 ft.

C. laurifolius (*E.*).—White flowers in June. Height, 4–6 ft.

C. lusitanicus (*H.H.E.*). — White flowers in July. Height, 2–4 ft.

C. monspeliensis (*H.H.E.*).—White flowers in July. Height, 2 ft.

C. purpureus (*H.H.E.*). — Purple flowers from June onwards. Height, 2 ft.

C. salvifolius in variety (*H.H.E.*).—White flowers from June onwards. Height, 2 ft.

C. villosus (*H.H.E.*).—Purple flowers in June. Height, 3 ft.

CLERODENDRON.

C. trichotomum.—White and purple flowers in September. Height, 8 ft.

CLETHRA. Pepper Tree.

C. acuminata.—The White Alder, with white flowers in July. Height, 5–8 ft.

C. alnifolia.—The Pepper Tree or Sweet Pepperbush, with white flowers in July. Height, 5 ft.

C. canescens (*H.H.E.*).—White flowers in July. Height, 5–6 ft.

COLLETIA.

C. cruciata.—The Anchor Plant, with white flowers from June onwards. Height, 4 ft.

C. spinosa.—White flowers in June. Height, 6–12 ft.

COLUTEA. Bladder Senna.

C. arborescens.—Yellow flowers in May. Height, 10 ft.

C. cruenta.—Copper-red flowers in June. Height, 6–8 ft.

C. japonica.—Red flowers in May. Height, 2–4 ft.

CORNUS. Dogwood.

C. alba in variety.—White flowers in May. Height, 6–8 ft.

C. Amomum.—The Kinnikinnik, with yellow-white flowers in June. Height, 8 ft.

C. capitata (*H.H.E.*).—Green and yellow flowers in June. Height, 6–8 ft.

C. florida (*H.H.E.*).—The Flowering Dogwood, with white flowers in April. Height, 8–15 ft.

C. Kousa.—Yellow and white flowers in June. Height, 6–8 ft.

C. macrophylla.—White flowers in July. Height, 10–15 ft.

C. Mas in variety.—The Cornel or Cornelian Cherry, with yellowish flowers in February. Height, 8–10 ft.

C. Nuttallii.—White flowers in June. Height, 6–8 ft.

C. sanguinea.—The Common Dogwood or Dogberry, with green and white flowers in June. Height, 6–10 ft.

C. stolonifera. — The Red-Osier Dogwood, with whitish flowers in May. Height, 6 ft.

C. tartarica in variety. — White flowers in July. Height, 8 ft.

COROKEA.

C. Cotoneaster (*H.H.E.*).—Yellow flowers in June. Height, 6 ft.

CORONILLA. Scorpion Senna. See also separate article.

C. Emerus.—Yellow flowers in April. Height, 3–4 ft.

CORYLOPSIS.

C. himalayana.—Yellow flowers in March. Height, 6 ft.

C. pauciflora.—Yellow flowers in March. Height, 6 ft.

C. spicata.—Yellow flowers in February. Height, 3–4 ft.

CORYLUS. See article on *Trees.*

COTONEASTER. Rock Spray.

C. acuminata.—White flowers in May. Height, 3–6 ft.

C. acutifolia.—White flowers in May. Height, 4–6 ft.

C. adpressa.—White flowers in April. Height, 1 ft.

C. affinis.—White flowers in May. Height, 3–6 ft.

C. bacillaris.—White flowers in May. Height, 4–8 ft.

C. buxifolia (*E.*).—Pink flowers in April. Height, 6–10 ft.

C. Franchetii (*E.*).—White flowers in May. Height, 6–8 ft.

C. frigida.—White flowers from April onwards. Height, 8–15 ft.

C. horizontalis (*E.*).—Pinkish flowers from April onwards. Height, 2–4 ft.

C. *humifusa* (*E.*).—White flowers from April onwards. Height, 1 ft.

C. *microphylla* (*E.*).—White flowers from April onwards. Height, 4–8 ft.

C. *pannosa*.—Yellowish-white flowers in May. Height, 2–6 ft.

C. *reflexa*.—White flowers from May onwards. Height, 2–6 ft.

C. *rotundifolia* (*E.*).—White flowers from April onwards. Height, 3–6 ft.

C. *rugosa Henryi*.—White flowers from May onwards. Height, 6 ft.

C. *salicifolia* (*E.*).—White flowers in May. Height, 6 ft.

C. *Simonsii*.—White flowers in May. Height, 6 ft.

C. *turbinata* (*E.*).—White flowers in May. Height, 6–8 ft.

C. *uniflora* (*E.*).—White flowers in May. Height, 6–8 ft.

CYDONIA. Quince. See also Pyrus in article on *Trees*, and article on *Quinces*.

C. *japonica* in variety.—The Japan Quince or Japanese Quince, with crimson to white flowers in April. Height, 6–8 ft.

C. *Maulei* in variety.—Scarlet to white flowers in March. Height, 3–4 ft.

C. *sinensis* (*H.H.D.*).—The Chinese Quince, with flowers of various colours in the spring. Height, 10–20 ft.

C. *vulgaris*. See article on *Quinces*.

CYTISUS. Broom.

C. *albus*.—The White Spanish Broom, with white flowers in May. Height, 4–8 ft.

C. *Ardoini*.—Yellow flowers from May onwards. Height, ½–1 ft.

C. *austriacus*.—Yellow flowers in June. Height, 3–5 ft.

C. *Beanii*.—Yellow flowers in May. Height, 2–4 ft.

C. *biflorus*.—Yellow flowers in May. Height, 2–4 ft.

C. *capitatus*.—Yellow flowers in July. Height, 3–6 ft.

C. *Dallimorei*.—Pink flowers in June. Height, 3 ft.

C. *decumbens*.—Pink flowers in June. Height, 2–3 ft.

C. *kewensis*.—Creamy-yellow flowers in May. Height, 1–2 ft.

C. *nigricans Carlieri*.—Yellow flowers in July. Height, 3–5 ft.

C. *praecox*.—Cream or white flowers in April. Height, 4–6 ft.

C. *purpureus* in variety.—Red, pink, or white flowers in June. Height, 2–3 ft.

C. *schipkaensis*.—White flowers in May. Height, 1 ft.

C. *scoparius* in variety.—The Common Broom, with yellow flowers in May. Height, 4–8 ft.

C. *scoparius andreanus*.—Yellow and brown flowers in May. Height, 4–8 ft.

DABOËCIA. St. Dabeoc's Heath. See also article on *Heaths*.

D. *polifolia* in variety.—Purple to white flowers in May. Height, 1 ft.

DAPHNE. See also separate article.

D. *blagayana* (*E.*).—The King's Garland Flower, with white flowers in May. Height, 1 ft.

D. *Cneorum*.—The Garland Flower, with red flowers in June. Height, 1–2 ft.

D. *Laureola*.—The Spurge or Wood Laurel, with yellowish flowers in April. Height, 1–3 ft.

D. *Mezereum* in variety.—The Mezereon, with purple to white flowers from February onwards. Height, 3–5 ft.

D. *pontica* (*E.*).—Greenish flowers from April to May. Height, 2–3 ft.

DAPHNIPHYLLUM.

D. *macropodum* (*E.*).—The Sioumi, with black fruit in autumn and insignificant flowers. Height, 6 ft.

DESFONTAINEA.

D. *spinosa* (*E.*).—Scarlet and yellow flowers in August. Height, 3–6 ft.

DEUTZIA.

D. *corymbosa*.—White flowers in May and June. Height, 8 ft.

D. *crenata* in variety.—White or pink flowers in June. Height, 4–8 ft.

D. *discolor* in variety.—White to pink flowers in May. Height, 2–3 ft.

D. *gracilis* in variety.—White flowers in May. Height, 2–3 ft.

D. *Lemoinei* in variety.—White to pink flowers in May. Height, 3–5 ft.

D. *parviflora*.—White flowers in May. Height, 2–3 ft.

D. *scabra*.—White flowers in May. Height, 2–3 ft.

D. *Vilmoriana*.—White flowers in June. Height, 4–8 ft.

D. *Wilsonii*.—White flowers in June. Height, 2–4 ft.

DIERVILLA (Syn. *Weigela*). Bush Honeysuckle.

D. *florida* in variety.—White to red flowers in April. Height, 4–6 ft.

D. *hortensis* in variety.—White to

red flowers in April. Height, 4–5 ft.

- *D. japonica.*—Red flowers from April onwards. Height, 4–6 ft.
- *D. Lonicera.*—Yellow flowers in May. Height, 3 ft.
- *D. middendorfiana.*—Yellowish-white flowers in May. Height, 3 ft.
- *D. sessilifolia.*—Yellow flowers in May. Height, 3–6 ft.

ELAEAGNUS.

- *E. angustifolia.*—Yellowish flowers in August. Height, 6 ft.
- *E. argentea.*—The SILVER BERRY, with yellow flowers from July onwards. Height, 6 ft.
- *E. glabra.*—The YAMA GUMI, with white flowers in August. Height, 3–6 ft.
- *E. macrophylla* (*E.*). — The FON GUMI, with yellowish flowers in August. Height, 6 ft.
- *E. pungens* (*E.*).—The NATSU GUMI, with yellowish flowers in August. Height, 6 ft.
- *E. umbellata.*—The MASIRO GUMI, with white flowers in June. Height, 6 ft.

EMBOTHRIUM. FIRE BUSH.

- *E. coccineum* (*H.H.E.*). — Scarlet flowers in May. Height, 3 ft.

ENKIANTHUS.

- *E. campanulatus* (*H.H.E.*).—Red flowers in May. Height, 5–10 ft.
- *E. himalaicus* (*H.H.E.*).—Orange-red flowers in June. Height, 8–15 ft.
- *E. japonicus* (*H.H.E.*). — White flowers in March. Height, 4–10 ft.

ERICA. HEATH. See also article on *HEATHS.*

- *E. arborea* (*H.H.E.*).—The TREE HEATH, with white flowers in May. Height, 5 ft.
- *E. australis* (*H.H.E.*). — Purple flowers in March. Height, 2–3 ft.
- *E. carnea* (*E.*).—Purple to white flowers from January onwards. Height, 1 ft.
- *E. lusitanica* (*H.H.E.*). — Purple flowers in May. Height, 3–5 ft.
- *E. mediterranea* in variety (*E.*).—Purple to white flowers in February. Height, 1 ft.
- *E. stricta* (*E.*).—Purple flowers in April. Height, 1 ft.
- *E. Tetralix* in variety (*E.*).—The CROSS-LEAVED HEATH, with purple to white flowers in July. Height, 1 ft.
- *E. vagans* in variety (*E.*).—The CORNISH HEATH, with purple to white flowers in September. Height, 2 ft.
- *E. Veitchii.*—Purple flowers in June. Height, 2–3 ft.

ESCALLONIA.

- *E. exoniensis* (*H.H.E.*).—Red flowers in July. Height, 4–6 ft.
- *E. floribunda* (*H.H.E.*) — White flowers in July. Height, 4–6 ft.
- *E. langleyensis* (*E.*).—Red flowers in June. Height, 6–8 ft.
- *E. macrantha* (*H.H.E.*).—Red flowers from June onwards. Height, 3–8 ft.
- *E. philippiana* (*E.*).—White flowers from June onwards. Height, 6 ft.
- *E. rubra* (*H.H.E.*).—Red flowers in September. Height, 3–6 ft.

EUCRYPHIA. See article on *CLIMBING AND TRAILING PLANTS.*

EUONYMUS. SPINDLE TREE. See also article on *CLIMBING AND TRAILING PLANTS.*

- *E. americanus.*—The STRAWBERRY BUSH, with pink flowers from June onwards. Height, 6 ft.
- *E. atropurpureus.*—The BURNING BUSH, with purple flowers in June. Height, 6 ft.
- *E. europaeus.*—The SPINDLE TREE, with white flowers in June. Height, 5 ft.
- *E. japonicus* (*E.*).—Pink flowers in July. Height, 6 ft.
- *E. radicans.* White flowers in July, decumbent.

EXOCHORDA.

- *E. grandiflora.*—White flowers in May. Height, 6 ft.

FABIANA. PICHI.

- *F. imbricata* (*E.*).—White flowers from May onwards. Height, 6 ft.

FATSIA.

- *F. japonica*, Syn. *Aralia Sieboldii* (*H.H.E.*).—White flowers in May. Height, 4–10 ft.

FENDLERA.

- *F. rupicola* (*H.H.E.*).—White flowers in June. Height, 4 ft.

FORSYTHIA. See article on *CLIMBING AND TRAILING PLANTS.*

FOTHERGILLA.

- *F. Gardeni* (Syn. *F. alnifolia*).—White flowers from May to June. Height, 4 ft.

FREMONTIA.

- *F. californica* (*E.*).—Yellow flowers in April. Height, 6 ft.

FUCHSIA. See also separate article.

- *F. corallina.*—Scarlet flowers in July. Height, 4–6 ft.
- *F. macrostemma.*—Scarlet flowers in July. Height, 2–8 ft.

F. procumbens.—Scarlet flowers in June. Height, 1 ft.

F. Riccartoni.—Scarlet flowers in July. Height, [illegible]–8 ft.

GARRYA.

G. elliptica (*E.*).—Greenish flowers in October. Height, 6 ft.

GAULTHERIA. WINTERGREEN. See also separate article.

G. nummularioides (*E.*). — White flowers in May. Height, 6 ins.

G. procumbens (*E.*).—The CREEPING WINTERGREEN or PARTRIDGE BERRY, with white flowers from May to July. Height, 6 ins.

G. Shallon.—The SALAL or SHALLON, with white flowers in May. Height, 2–6 ft.

GENISTA. FURZE.

G. aethnensis (*E.*).—The MOUNT ETNA BROOM, with yellow flowers in July. Height, 4–6 ft.

G. anglica (*E.*). — The NEEDLE FURZE or PETTY WHIN, with yellow flowers in May. Height, 1–2 ft.

G. germanica.—Yellow flowers in July. Height, 3 ft.

G. hispanica (*E.*).—The SPANISH GORSE, with yellow flowers in July. Height, 3 ft.

G. monosperma (*H.H.E.*).—Yellow flowers in June. Height, 3 ft.

G. radiata (*E.*).—Yellow flowers in July. Height, 1½ ft.

G. tinctoria.—The DYERS' GREENWEED, with yellow flowers in July. Height, 6 ft.

G. virgata.—Yellow flowers in July. Height, 5 ft.

HALESIA. SNOWDROP TREE.

H. hispida.—The ASAGARA, with white flowers in May. Height, 6–8 ft.

H. tetraptera.—The SILVER-BELL or SNOWDROP TREE, with white flowers in May. Height, 6–10 ft.

HALIMODENDRON. SALT TREE.

H. argenteum.—Pink flowers in May. Height, 6 ft.

HAMAMELIS. WITCH HAZEL.

H. arborea.—The MANSAK or WITCH HAZEL, with yellow flowers from December onwards. Height, 6–20 ft.

H. japonica.—Yellow flowers from December onwards. Height, 6–15 ft.

H. japonica zuccariniana.—A better form.

H. mollis.—Yellow flowers from December onwards. Height, 10 ft.

H. virginica.—The WITCH HAZEL, with yellow flowers in May.

HEDYSARUM. FRENCH HONEYSUCKLE. See also separate article.

H. multijugum.—Red flowers in July. Height, 4–6 ft.

HELIANTHEMUM. SUN ROSE. See also separate article.

H. formosum (*H.H.E.*). — Yellow flowers in June. Height, 4 ft.

H. halimifolium (*H.H.E.*).—Yellow flowers in June. Height, 4 ft.

H. rosmarinifolium (*E.*).—Yellow flowers in June. Height, 2 ft.

H. vulgare in variety (*E.*).—The ROCK ROSE, with flowers from white to deep red, etc., in June. Height, 9 ins.

HIBISCUS.

H. syriacus in variety (*H.H.D.*).—Red to white flowers in August. Height, 8 ft.

HIPPOPHAE. SEA BUCKTHORN.

H. rhamnoides. — Foliage plant. Height, 2–12 ft.

HYDRANGEA. See also separate article.

H. altissima (*H.H.E.*). — White flowers in August. Height, 6 ft.

H. arborescens (*H.H.E.*). — White flowers in July. Height, 6 ft.

H. hortensis in variety (*H.H.E.*).—White to pink flowers in July. Height, 2–5 ft. Its variety *rosea* has rosy flowers, while its variety *stellata* has pinkish flowers.

H. paniculata.—White flowers from May onwards. Height, 3–6 ft.

H. quercifolia.—White flowers in September. Height, 4 ft.

HYMENANTHERA.

H. crassifolia *H.H.E.*). — White berries from July onwards. Height, 2–4 ft.

HYPERICUM. ST. JOHN'S WORT. See also separate article.

H. Androsaemum. — The TUTSAN, with yellow flowers in August. Height, 2 ft.

H. Ascyron.—Yellow flowers in June. Height, 2 ft.

H. aureum.—Yellow flowers in June. Height, 2–4 ft.

H. calycinum (*E.*).—The ROSE OF SHARON or TUTSAN, with yellow flowers in July. Height, 1–2 ft.

H. chinense (*H.H.E.*). — Yellow flowers in June. Height, 3 ft.

H. Coris (*H.H.E.*).—Yellow flowers in June. Height, 9 ins.

H. densiflorum.—Yellow flowers in June. Height, 2 ft.

H. elatum—Yellow flowers in July. Height, 5 ft.

H. hircinum.—Yellow flowers in August. Height, 3 ft.

H. hookerianum (*H.H.E.*).—Yellow flowers in July. Height, 2–3 ft.

H. moserianum.—Yellow flowers in July. Height, 3 ft.

H. patulum (*E.*).—Yellow flowers in June. Height, 2 ft.

H. uralum.—Yellow flowers in July. Height, 2 ft.

ILEX. See article on *HOLLY*.

ITEA.

I. virginica.—White flowers in July. Height, 6 ft.

JAMESIA.

J. americana.—White flowers in May. Height, 3–4 ft.

KALMIA.

K. angustifolia in variety (*E.*).—The SHEEP LAUREL, with purple to white flowers in June. Height, 3 ft.

K. glauca.—Purple flowers from April onwards. Height, 2 ft.

K. latifolia (*E.*).—The CALICO-BUSH, with red flowers in June. Height, 8 ft.

KERRIA. JEW'S MALLOW.

K. japonica in variety.—Yellow flowers from March onwards. Height, 5–10 ft.

LAURUS. SWEET BAY.

L. nobilis.—Yellowish-white flowers in April. Height, 6–15 ft.

LAVANDULA. LAVENDER. See also separate article.

L. Spica in variety.—Lilac to white flowers in August. Height, 2 ft.

L. vera.—Blue flowers in July. Height, 2 ft.

LEDUM. LABRADOR TEA.

L. glandulosum (*E.*).—White flowers in April. Height, 2–6 ft.

L. latifolium (*E.*).—The LABRADOR TEA, with white flowers in April. Height, 3 ft.

L. palustre.—White flowers in April. Height, 2 ft.

LEIOPHYLLUM. SAND MYRTLE.

L. buxifolium (*E.*).—White flowers in May. Height, ½–1 ft.

LESPEDEZA.

L. bicolor.—Rose-purple flowers in October. Height, 3 ft.

L. capitata.—The ROUND-HEADED BUSH CLOVER, with purplish flowers in the autumn. Height, 2–3 ft.

L. violacea.—The BUSH CLOVER, with purplish flowers in the autumn. Height, 2–3 ft.

LEUCOTHOE.

L. axillaris (*E.*).—White flowers in May. Height, 1–2 ft.

L. Catesbaei (*E.*).—White flowers in May. Height, 2–4 ft.

L. Davisiae (*E.*).—White flowers in May. Height, 3–5 ft.

L. racemosa (*E.*).—White flowers in May. Height, 4–10 ft.

L. recurva.—White flowers in June. Height, 2 ft.

LEYCESTERIA. FLOWERING NUTMEG.

L. formosa.—White and purple flowers in August. Height, 4–6 ft.

LIGUSTRUM. PRIVET.

L. coriaceum.—White flowers in June. Height, 3–6 ft.

L. Ibota (*E.*).—White flowers in June. Height, 3 ft.

L. japonicum (*E.*).—White flowers in June. Height, 6 ft.

L. lucidum (*E.*).—White flowers in June. Height, 8 ft.

L. ovalifolium (*E.*).—The OVAL-LEAVED PRIVET, with white flowers in June. Height, 6–12 ft.

L. Quihoui.—White flowers in June. Height, 6 ft.

L. sinense (*E.*).—White flowers in June. Height, 6–8 ft.

L. vulgare (*E.*).—The COMMON PRIVET, with white flowers in June. Height, 6–10 ft.

L. vulgare aureum[1] (*E.*).—The GOLDEN PRIVET, with white flowers in June and golden foliage. Height, 6–10 ft.

LIQUIDAMBAR. See article on *TREES*.

LONICERA. HONEYSUCKLE. See also article on *CLIMBING AND TRAILING PLANTS*.

L. Albertii.—Rosy flowers in June. Height, 3–6 ft.

L. Maackii.—White flowers in June. Height, 4 ft.

L. nitida (*E.*)—White flowers in June. Height, 2–6 ft.

L. pileata.—White flowers in June. Height, 1 ft.

L. tatarica.—Pink flowers in April. Height, 6–10 ft.

L. thibetica.—Pink flowers in April. Height, 3 ft.

MAGNOLIA. See also articles on *CLIMBING AND TRAILING PLANTS* and *TREES*.

M. hypoleuca.—White flowers in June. Height, 10–20 ft.

---

[1] Several other varieties of *L. vulgare* might well be grown if space admits.—EDITOR.

M. Lennei.—Rose flowers in April. Height, 5–15 ft.

M. obovata. — Purple and white flowers in April. Height, 6 ft.

M. parviflora.—White and rose flowers in June. Height, 6–10 ft.

M. soulangeana.—White tinted purple flowers from March to May. Height, 10–25 ft.

M. stellata.—White or rose flowers in March. Height, 3–6 ft.

M. Watsoni.—White flowers in June. Height, 6–10 ft.

MENZIESIA. See also DABOËCIA.

M. globularis.—Brown flowers in May. Height, 6 ins.

MYRTUS. MYRTLE. See also article on *MYRTLE*.

M. communis in variety (*H.H.E.*).—The COMMON MYRTLE, with white flowers in June. Height, 4–10 ft.

NEILLIA.

N. amurensis.—White flowers in June. Height, 5 ft.

N. opulifolia. — The NINE-BARK, with white flowers in June. Height, 5–8 ft.

NOTOSPARTIUM.

N. Carmichaeliae (*H.H.E.*).—Pink flowers from June onwards. Height, 4–10 ft.

NUTTALLIA.

N. cerasiformis.—The OSO BERRY, with white flowers from March onwards. Height, 4–6 ft.

OLEARIA. DAISY BUSH.

O. Haastii (*H.H.E.*).—White flowers from July to August. Height, 3–8 ft.

O. ilicifolia (*H.H.E.*). — White flowers from July onwards. Height, 2–6 ft.

O. macrodonta (*E.*).—White flowers from July onwards. Height, 2–6 ft.

O. nummularifolia (*E.*). — White flowers in July. Height, 3 ft.

O. stellulata (*H.H.E.*).—The STARRY DAISY BUSH, with white flowers from June onwards. Height, 2–6 ft.

ONONIS. REST HARROW. See also separate article.

O. fruticosa (*H.H.E.*).—Pink flowers from May onwards. Height, 2 ft.

OSTEOMELES.

O. anthyllidifolia (*E.*). — White flowers in July. Height, 6–20 ft.

OXYCOCCUS. CRANBERRY.

O. macrocarpus. — The AMERICAN CRANBERRY, with pink flowers in May. Height, 9 ins.

O. palustris.—The CRANBERRY, with pink flowers in May. Height, 6 ins.

PAEONIA. PAEONY or PEONY. See also article on *PAEONY*.

P. lutea.—Yellow flowers in June. Height, 2 ft.

P. Moutan in variety.—The MOUTAN or TREE PAEONY, with purple to white flowers in May. Height, 3–6 ft.

PALIURUS. CHRIST'S THORN.

P. australis (Syns. *P. aculeatus* and *P. Spino-Christi*).—Greenish flowers in June. Height, 4 ft.

PARROTIA.

P. persica.—Scarlet flowers in June. Height, 6–15 ft.

PERNETTYA.

P. mucronata in variety.—Berries from white to purple. Height, 2–6 ft.

PHILADELPHUS. MOCK ORANGE.

P. coronarius in variety.—White flowers in May. Height, 8 ft.

P. Coulteri.—White flowers in May. Height, 6 ft.

P. gordonianus.—White flowers in July. Height, 6–10 ft.

P. grandiflorus.—White flowers in June. Height, 6–15 ft.

P. hirsutus.—White flowers in June. Height, 3–6 ft.

P. Lemoinei in variety.—White to rose flowers in June. Height, 3–8 ft.

P. Lewisii.—White flowers in June. Height, 3–6 ft.

P. microphyllus.—White flowers in June. Height, 2–4 ft.

P. Satsumi.—White flowers in July. Height, 5 ft.

PHILLYRAEA.

P. angustifolia (*E.*).—White flowers in May. Height, 8 ft.

P. decora (*E.*).—White flowers in May. Height, 6 ft.

P. latifolia in variety (*E.*).—White flowers in May. Height, 6–15 ft.

P. media in variety.—White flowers in May. Height, 6–15 ft.

PHLOMIS. JERUSALEM SAGE. See also separate article.

P. fruticosa (*E.*).—Yellow flowers in June. Height, 3 ft.

PHOTINIA.

P. serrulata.—White flowers in May. Height, 6–10 ft.

PIERIS.

P. floribunda (*E.*).—White flowers in April. Height, 2–6 ft.

P. formosa (*E.*).—White flowers in April. Height, 3 ft.

P. japonica.—White flowers in May. Height, 3–6 ft.

P. mariana.—The Stagger-Bush, with white flowers in May. Height, 4 ft.

P. nitida.—White to purple flowers in March. Height, 6 ft.

P. ovalifolia (*H.H.E.*). — Pinkish flowers in May. Height, 2 ft.

PLAGIANTHUS. Whau-whi.

P. Lyalli (*H.H.E.*).—White flowers in June. Height, 6–15 ft.

POTENTILLA. Cinquefoil. See also separate article.

P. Friedrichseni.—Yellow flowers in July. Height, 2–4 ft.

P. fruticosa.—Yellow flowers in July. eight, 3–5 ft.

P. Veitchii.—White flowers in July. Height, 3–6 ft.

RAPHIOLEPIS. See article on *Climbing and Trailing Plants.*

RHODODENDRON. See separate article.

RHODOTYPOS.

R. kerrioides. — White flowers in April. Height, 6–15 ft.

RHUS. Sumach.

R. copallina.—The Dwarf Sumach, with greenish flowers in August. Height, 6–8 ft.

R. cotinoides.—The Chittam Wood or Smoke Bush, with purple flowers in June. Height, 6 ft.

R. Cotinus in variety.—The Venetian Sumach, with purple flowers in June. Height, 6 ft.

R. glabra.—The Smooth Sumach, with greenish flowers in August. Height, 8 ft.

R. Osbeckii.—White flowers in June. Height, 8–15 ft.

R. Toxicodendron.[1]—The Poison Ivy or Poison Oak, with greenish flowers in June. Height, 1–2 ft.

R. typhina in variety.—The Staghorn Sumach, with green and yellow flowers in July. Height, 8–15 ft.

R. venenata.[2]—The Poison Sumach, with green flowers in July. Height, 6–18 ft.

R. vernicifera.—The Lacquer Tree, with green and yellow flowers in July. Height, 10 ft.

RIBES. Currant and Gooseberry. See article on *Bush Fruits.*

R. alpinum in variety. — Green flowers in May. Height, 2 ft.

R. aureum. — The Buffalo or Missouri Currant, with yellow flowers in May. Height, 6 ft.

R. gordonianum.—Yellow and red flowers in May. Height, 6 ft.

R. Grossularia in variety.—The Gooseberry. See article on *Bush Fruits.*

R. nigrum.—The Black Currant. See article on *Bush Fruits.*

R. rubrum.—The Red Currant. See article on *Bush Fruits.*

R. rubrum album.—The White Currant. See article on *Bush Fruits.*

R. sanguineum in variety.—The Flowering Currant, with flowers from red to white in April. Height, 6 ft.

R. speciosum (*H.H.E.*).—Crimson flowers from May to July. Height, 4–6 ft.

ROMNEYA. Tree Poppy. See also separate article.

R. Coulteri.—White flowers from June onwards. Height, 3–6 ft.

R. trichocalyx.—The Californian Tree Poppy, with white flowers from June onwards. Height, 3–6 ft.

ROSA. See articles on *Rose*, *Rose Classes*, *Rose Species*, etc.

ROSMARINUS. Rosemary. See also article on *Potherbs.*

R. officinalis in variety.—The Rosemary, with aromatic leaves. Height, 4 ft.

RUBUS. Bramble and Raspberry.

R. biflorus.—White flowers in May. Height, 3–6 ft.

R. caesius.—The Dewberry, with white flowers in June. Height, 2 ft.

R. canadensis.—The Low Blackberry or Low Bramble, with white flowers in June. Height 3 ft.

R. deliciosus.—White flowers in June. Height, 3 ft.

R. fruticosus in variety.—Pink to white single and double flowers in July. Height, 6–10 ft.

R. laciniatus.—White flowers in July. Height, 6–10 ft.

R. nuthanus.—The Salmon-berry, with white flowers in August. Height, 4 ft.

R. occidentalis. — The Thimbleberry, with white flowers in May. Height, 5 ft.

R. odoratus.—The Purple-flowering Raspberry, with purple flowers from June onwards. Height, 3–8 ft.

---

[1] Poisonous to handle.—Editor.

[2] Very poisonous to handle.—Editor.

R. phoenicolasius.—Pink flowers in June. Height, 6–10 ft.

R. strigosus.[1] — The Wild Red Raspberry, with white flowers in June. Height, 3–4 ft.

R. trivialis.[1] — The Low Bush Bramble, with white flowers in July. Height, 2 ft.

R. villosus.—The High Blackberry, with white flowers in July. Height, 4 ft.

RUTA. Rue. See also articles on *Potherbs* and *Ruta*.

R. graveolens.—The Common Rue, with yellow flowers in June. Height, 2–3 ft.

SALIX. See article on *Trees*.

SAMBUCUS. See article on *Trees*.

SENECIO. See also separate article.

S. Grayii (*H.H.E.*).—Yellow flowers in June. Height, 2 ft.

S. laxifolius (*H.H.E.*). — Yellow flowers in June. Height, 2 ft.

SHEPHERDIA. Buffalo Berry and Rabbit Berry.

S. argentea.—Yellow flowers in April. Height, 6–10 ft.

S. canadensis (*H.H.E.*).—Yellowish flowers in April. Height, 10 ft.

SKIMMIA.

S. Fortunei (*E.*).—Scarlet berries in the autumn. Height, 3 ft.

S. japonica (*E.*).—Scarlet berries in the autumn. Height, 3 ft.

S. oblata. — Scarlet berries in the autumn. Height, 3 ft.

SOPHORA.

S. heptaphylla.—Yellow flowers in October. Height, 6 ft.

S. japonica in variety.—White flowers in August. Height, 10–20 ft.

S. macrocarpa (*H.H.E.*).—Yellow flowers in April. Height, 6 ft.

S. tetraptera (*H.H.E.*).—The Houma, with yellow flowers in May. Height, 12 ft.

SPARTIUM. Spanish Broom.

S. junceum.—The Yellow Spanish Broom, with yellow flowers in August. Height, 6 ft.

SPIRAEA. See also separate article.

S. Aitchisoni.—White flowers in August. Height, 6–12 ft.

S. arguta.—White flowers from March onwards. Height, 6 ft.

S. ariaefolia.—White flowers in June. Height, 8 ft.

S. bella.—Red flowers in July. Height, 2 ft.

S. betulifolia.—Pink flowers in June. Height, 2 ft.

S. bullata.—Pink flowers in July. Height, 1½–2 ft.

S. cana.—White flowers in June. Height, 1½ ft.

S. canescens. — White flowers in June. Height, 6–8 ft.

S. cantoniensis.—White flowers in June. Height, 4–8 ft.

S. chamaedrifolia in variety.—White flowers in June. Height, 4 ft.

S. crenata.—White flowers in April. Height, 4 ft.

S. decumbens.—White flowers in June. Height, 1½ ft.

S. discolor.—White flowers in June. Height, 8 ft.

S. Douglasi.—Pink flowers in August. Height, 6 ft.

S. Hacqueti. — White flowers in June. Height, 1 ft.

S. hypericifolia in variety.—White flowers in April. Height, 5 ft.

S. japonica in variety.—Flowers from red to white in July. Height, 4–6 ft. Its variety *Bumalda* has red flowers.

S. laevigata.—Red flowers in May Height, 4–6 ft.

S. lindleyana.—White flowers in September. Height, 6–8 ft.

S. prunifolia fl. pl.—White flowers in April. Height, 4–6 ft.

S. pubescens.—White flowers in May. Height, 6 ft.

S. salicifolia in variety.—White flowers in July. Height, 5 ft.

S. sorbifolia.—White flowers in August. Height, 4 ft.

S. Thunbergi.—White flowers in March. Height, 1–3 ft.

S. tomentosa.—The Hardhack or Steeple-Bush, with white flowers in August. Height, 5 ft.

S. trilobata.—White flowers in May. Height, 3 ft.

S. Van Houttei.—White flowers in May. Height, 2–4 ft.

S. Wilsonii.—White flowers in June and July. Height, 6 ft.

STACHYURUS.

S. praecox.—Pink flowers in April. Height, 6–10 ft.

STAPHYLEA. Bladder-nut.

S. colchica.—White flowers in June. Height, 6 ft.

S. Coulombieri. — White flowers in June and July. Height, 6 ft.

S. pinnata.—The Bladder-nut, with white flowers in June. Height, 6 ft.

---

[1] These are only suitable for the wild garden.—Editor.

S. trifolia.—The American Bladder-nut, with white flowers in May. Height, 6 ft.

STEPHANANDRA.

S. flexuosa.—White flowers in July. Height, 8–15 ft.

S. Tanakae.—White flowers in July. Height, 6–8 ft.

STRANVAESIA.

S. glaucescens (*H.H.E.*).—White flowers in July. Height, 8–15 ft.

S. undulata.—White flowers in July. Height, 6–15 ft.

STUARTIA.

S. pentagyna.—Cream flowers in June. Height, 6–10 ft.

S. Pseudo-camellia.—White flowers in June. Height, 8–10 ft.

S. virginica.—White flowers in April. Height, 8 ft.

STYRAX. Storax.

S. americanum in variety.—White flowers in June. Height, 6 ft.

S. grandifolium.—White flowers in June. Height, 6 ft.

S. Obassia.—White flowers in June. Height, 6–10 ft.

S. officinale.—The Storax, with white flowers in July. Height, 12 ft.

S. serrulatum.—White flowers in April and May. Height, 6–20 ft.

S. Wilsonii.—White flowers in April. Height, 6–12 ft.

SYMPHORICARPUS. Snowberry.

S. Heyeri.—Pink flowers in July. Height, 6 ft.

S. occidentalis.—The Wolf-berry, with pink flowers in July. Height, 6 ft.

S. orbiculatus (Syn. *S. vulgaris*).—The Coral-berry or Indian Currant, with white flowers in August. Height, 6 ft.

S. racemosus.—The Snowberry, with rose flowers in August. Height, 6 ft.

S. vulgaris. See *S. orbiculatus.*

SYRINGA. Lilac.

S. chinensis in variety.—The Rouen Lilac, with violet to white flowers in May. Height, 6 ft.

S. Emodi in variety.—White flowers in April. Height, 8–10 ft.

S. japonica.—White flowers in May. Height, 4–8 ft.

S. Josikaea.—Lilac flowers in June. Height, 8 ft.

S. persica in variety.—The Persian Lilac, with purple to white flowers in May. Height, 5 ft.

S. vulgaris in variety.—The Common Lilac, with purple to white flowers in May. Height, 8–20 ft.

TAMARIX. Tamarisk.

T. gallica.—The Common or French Tamarisk, with rosy-pink flowers in July. Height, 6–10 ft.

T. hispida.—Rosy-carmine flowers in July. Height, 6 ft.

T. Pallasii.—Red flowers in July. Height, 8 ft.

T. tetrandra.—Whitish-pink flowers in July. Height, 6 ft.

TEUCRIUM. — See also separate article.

T. fruticans (*H.H.E.*).—Blue flowers in July. Height, 3 ft.

TRICUSPIDARIA (Syn. *Crinodendron*).

T. dependens (*H.H.E.*).—White flowers in June. Height, 6 ft.

T. hexapetala, Syn. *Crinodendron Hookeri* (*H.H.E.*). — Crimson flowers in June. Height, 4–10 ft.

ULEX. Furze, Gorse, or Whin.

U. europaeus.—The Common Furze, etc., with yellow flowers in spring, summer, and autumn. Height, 6 ft.

U. nanus (Syn. *U. europaeus nanus*).—The Cat Whin or Dwarf Gorse, with yellow flowers in July. Height, 12–18 ft.

VACCINIUM.

V. arboreum.—The Farkle-berry, with white or red flowers in May. Height, 6 ft.

V. Arctostaphylos (*E.*).—The Bear Berry, with greenish-white flowers in May. Height, 6 ft.

V. canadense (*E.*).—The Canadian Whortleberry, with white and red flowers in May. Height, 1 ft.

V. corymbosum in variety (*E.*).—The Blueberry, Common Blueberry, or Swamp Blueberry, with white flowers in May. Height, 7 ft.

V. Myrtillus (*E.*).—The Bilberry, Blaeberry, or Whortleberry, with pink flowers in May. Height, 1½ ft.

V. ovatum (*E.*).—Rose flowers in May. Height, 3–5 ft.

V. parvifolium (*E.*).—The Dwarf Blueberry, with pinkish flowers in May. Height, 1 ft.

V. pensylvanicum (*E.*).—White or lilac flowers in May. Height, 2–4 ft.

V. stamineum (*E.*).—The Deerberry, with white flowers in May. Height, 2 ft.

V. Vitis-idaea (*E.*).—The Cowberry,

with pink flowers in May. Height, 9 ins.

VERONICA. Speedwell. See also separate article.

V. amplexicaulis.—White flowers in July. Height, 1–2 ft.

V. Andersoni (*H.H.E.*).—Blue or purple flowers in July. Height, 1½ ft.

V. anomala (*E.*).—White flowers in July. Height, 3–6 ft.

V. Armstrongii (*E.*).—White flowers in July. Height, 1–3 ft.

V. balfouriana (*E.*).—Violet flowers in June. Height, 2–3 ft.

V. Bidwillii (*E.*).—Pale violet flowers in July. Height, 6 ins.

V. buxifolia (*E.*).—White flowers in June. Height, 2–3 ft.

V. carnosula (*E.*).—White flowers in June. Height, 1 ft.

V. chathamica (*H.H.E.*).—Purple flowers in July. Height, 1 ft.

V. Colensoi glauca (*H.H.E.*).—White or pinkish flowers in July. Height, 1–3 ft.

V. cupressoides (*E.*).—Violet flowers in July. Height, ½–2 ft.

V. decumbens (*E.*).—White or pink flowers in July. Height, 1 ft.

V. elliptica (*H.H.E.*).—White flowers in July. Height, 3–5 ft.

V. epacridea (*E.*).—White flowers in July. Height, 6 ins.

V. Fairfieldii (*E.*).—Lavender flowers in July. Height, 1–1½ ft.

V. formosa (*H.H.E.*).—Blue flowers in July. Height, 2–4 ft.

V. fruticulosa (*E.*).—Flesh-coloured flowers in July. Height, 6 ins.

V. Hectori (*E.*).—White and lilac flowers in June. Height, ½–2 ft.

V. hulkeana (*H.H.E.*).—Lilac flowers in July. Height, 1–3 ft.

V. Kirkii.—White flowers in July. Height, 5–10 ft.

V. Lewisii (*E.*).—White or purple flowers in July. Height, 3–6 ft.

V. Lindsayi (*E.*).—Pink flowers in July. Height, 1 ft.

V. loganioides (*E.*).—White flowers in May. Height, 1 ft.

V. parviflora (*H.H.E.*).—The Koromiko, with white or blush flowers in July. Height, 1–5 ft.

V. pimeleoides (*E.*).—Purple flowers in July. Height, ½–1 ft.

V. pinguifolia (*E.*).—White flowers in June. Height, 1 ft.

V. rakaiensis (*E.*).—White flowers in June. Height, 3–6 ft.

V. salicifolia (*H.H.E.*).—The Korumeek, with white or purplish flowers in July. Height, 2–6 ft.

V. saxatilis (*E.*).—Blue flowers in June. Height, 6 ins.

V. speciosa in variety (*H.H.E.*).—Purplish-blue flowers in July. Height, 3–6 ft.

V. Traversii (*E.*).—Whitish flowers in June. Height, 3–8 ft.

V. vernicosa (*E.*).—White flowers in July. Height, 1–4 ft.

VIBURNUM.

V. acerifolium.—The Dockmackie, with white flowers in July. Height, 4 ft.

V. Carlesii.—White flowers in June. Height, 3–6 ft.

V. davuricum.—White flowers in June. Height, 2 ft.

V. dentatum.—The Arrow-wood, with white flowers in June. Height, 6 ft.

V. dilatatum.—White flowers in June. Height, 10 ft.

V. Lantana in variety.—The Wayfaring Tree, with white flowers in May. Height, 10 ft.

V. lantanoides.—The Hobble-bush, with white flowers in June. Height, 5 ft.

V. macrocephalum.—White flowers in June. Height, 8–20 ft.

V. nudum.—The Withe Rod, with white flowers in June. Height, 8 ft.

V. odoratissimum (*H.H.E.*).—White flowers in May. Height, 2 ft.

V. Opulus in variety.—The Guelder Rose, with white flowers in July. Height, 10 ft.

V. Opulus sterile.—The Snowball Tree, with white flowers in July. Height, 10 ft.

V. prunifolium.—The Black Haw, with white flowers in May. Height, 8 ft.

V. rhytidophyllum (*E.*).—Yellowish-white flowers in June. Height, 6–8 ft.

V. Sieboldii (Syn. *V. tomentosum Sieboldii*), with white flowers in May. Height, 6 ft.

V. stellulatum.—White flowers from May to July. Height, 12–20 ft.

V. Tinus in variety.—The Laurustinus, with white flowers in July. Height, 5 ft.

V. tomentosum Mariesi.—White flowers in May. Height, 6 ft.

V. utile (*E.*).—White flowers in April. Height, 4–6 ft.

VINCA. Periwinkle. See also separate article on *Periwinkle*.

V. major in variety (*E.*).—Blue or white flowers in August. Height, 2 ft.

V. minor in variety (*E.*).—Blue to white flowers in August. Height, 1 ft.

WEIGELA. See DIERVILLA above.

XANTHOCERAS.
X. sorbifolia.—White flowers in April. Height, 10–15 ft.

YUCCA. See separate article.

S. A.

SHRUBS DISLIKING LIME.—See SHRUBS AND MISCELLANEOUS PLANTS in *LIME-HATERS.*

SHRUBS FOR EVERY GARDEN.—See *FLOWERING SHRUBS.*

SHRUBS FOR ROCK GARDENS.—See *ROCK GARDEN SHRUBS.*

SHRUBS FOR SEASIDE GARDENS.—See *SEASIDE GARDENS: PLANTS AND TREES FOR.*

SHRUBS FOR SHADE, SHRUBS FOR WALLS, and SHRUBS FOR WATER SIDE. — See *FLOWERING SHRUBS.*

SHRUBS, PLANTING.—See *PLANTING.*

SHRUBS, PRUNING.—See *PRUNING ROSES AND SHRUBS.*

SHRUBS, TRAINING.—See *TRAINING OF PLANTS.*

SHRUBS, TRANSPLANTING.—See *TRANSPLANTING.*

SIBBALDIA.—Now included in the genus *POTENTILLA.*

SIBERIAN ANDROSACE. — See ANNUAL SPECIES of the genus *ANDROSACE.*

SIBERIAN CRAB (*Pyrus baccata*).—See *TREES.*

SIBERIAN ELM (*Zelkova crenata*).—See *TREES.*

SIBERIAN FIR (*Abies sibirica*). —See *TREES.*

SIBERIAN PEA TREE (*Caragana arborescens*).—See *SHRUBS.*

SIBERIAN SPRUCE (*Picea obovata*). See *TREES.*

SICILIAN RUE (*Ruta bracteosa*).—See *RUTA.*

SICKENER.—See HARMFUL FUNGI in *FUNGI: EDIBLE AND HARMFUL.*

SIDALCEA (Nat. Ord. Malvaceæ)
This genus is comparatively little known, or only grown in large collections, and more is the pity, for it contains some lovely species of hardy perennial plants grand for cutting, and splendid for use in the herbaceous, perennial, or mixed border. Its culture is a matter of considerable ease. It will thrive splendidly in common, rich garden soil, provided this is not too cool and moist, and is easily propagated by seeds sown in the usual way for other hardy perennials in the spring or early summer. It may also be propagated by division of the rootstocks in the autumn or spring, at which latter period it may be most successfully planted. The following is a selection of the best species:—

Sidalcea candida.—This bears large pure-white spikes of bloom from June to September, and averages 1 yd. in height.

S. humilis.—Syn. *S. malvaeflora,* which see.

S. Listeri.—This bears fringed flowers of soft pink from July to September, and grows 3–4 ft. high.

S. malvaeflora (Syn. *S. humilis*).—This bears in its several forms, soft pink, rosy-red, or rosy-purple flowers from July to September, and grows 2–4 ft. high. Its variety *delphinifolia* has finer foliage.

S. spicata (Syn. *S. murrayana*).—This bears erect spikes of pink flowers from July to early October, on plants 2–4 ft. high.

SIEGLINGIA.—Now included in the genus *TRIODIA.*

SIEVE-TUBES.—See under TISSUES in *PLANT PHYSIOLOGY.*

SIEVERSIA.—Now included in the genus *GEUM.*

SIEVES.—See *GARDEN APPLIANCES.*

SILAUS (Pepper Saxifrage. Nat. Ord. Umbelliferæ).—On account of the word "Saxifrage" forming part of the English name of this genus of hardy perennials, unwary amateurs often purchase it in the hope that they are getting something choice. Various species, such as *S. carvifolius* (Syn. *S. virescens*), *S. flavescens* (Syn. *S. pratensis*), and *S. tenuifolius* are grown at Kew, all of them valueless from a decorative point of view.

SILENE (Campion, Catchfly, etc. Nat. Ord. Caryophyllaceæ).—This genus contains numerous hardy annual species, but few of these are of real garden value. It also contains many species useful for the perennial border and rock garden.

Annual Species.—These are best sown out of doors in April for summer flowering, and in August or September for spring blooming. They succeed best if transplanted into their flowering positions 6 ins. apart each way. All the varieties of *Silene pendula* are of neat compact growth, and are particularly suitable for spring bedding in association with daffodils, hyacinths, and tulips.

Silene gallica.—A useful, pink, summer blooming species about 18 ins. high.

S. pendula.—Both double and single forms of this are available. The type is a rose or crimson summer blooming plant growing 12 ins. high. *Bonnetti* is one of the best named varieties, with rose-coloured flowers. Other available coloured forms include white, pink, peach, red, and crimson.

Perennial Border Species.—These, which may also be grown in the rock garden, require the usual treatment for perennials and are propagated by seed sown in the usual way, or by division of the roots in the autumn or spring. All are suitable for the front portions of borders or edgings, etc. Good light soil and a sunny site are the essentials to success. A selection of useful sorts is given, but for a complete list of the numerous species larger works must be consulted:—

Silene altaica.—A yellow sort flowering in August and growing 12 ins. high.

S. amoena.—A white sort blooming in July and August. Height, 12 ins.

S. Asterias.—A desirable red July blooming sort about 12 ins. high.

S. cana.—A crimson or red sort flowering in June and July about 15 ins. high. *S. italica* of some.

S. corsica.—A little known desirable purple sort flowering in June and July, which averages 12 ins. high.

S. elata.—A tall white June flowering sort about a yard high.

S. laciniata.—A useful scarlet July blooming species about half a yard high.

S. maritima.[1]—A sort with white or reddish flowers coming in during July and August. Height varies from 4–12 ins. The double variety *S. maritima flore pleno* is attractive.

S. pennsylvanica.—A red June flowering sort about 12 ins. high.

S. regia.—A rather attractive crimson sort flowering from June onwards and averaging half a yard in height.

S. repens.—A useful pink sort blooming in August and September. It grows about 12 ins. high.

S. Schafta.—An exceedingly useful rose-coloured sort flowering from June to September, and ranging in height from 4–8 ins.

Rock Garden Species.—The following eight species are selected from a very large number which are available. They are propagated chiefly by division of the roots in the spring. Many also come freely from seeds sown in gentle heat in March.

---

[1] This is popularly called Witches' Thimble.—Editor.

Silene acaulis (Moss Campion or Cushion Pink).—This forms hillocks of pale green foliage. Flowers rosy-pink. Site open. Soil very gritty, moist. Flowering Period, June to August. Height, 2 ins.

S. alpestris.[1]—This has tufts of narrow green leaves. Flowers white. Site sunny. Soil rich, gritty. Flowering Period, May to July. Height, 4 ins.

S. Elizabethae.—This forms tufts of broad leaves. Flowers rose-pink, petals two-lobed. Site sunny. Soil rich, gritty. Flowering Period, June to July. Height, 4 ins.

S. Hookeri.—A dwarf plant. Flowers deep rose coloured, fringed petals. Site, half-shade. Soil sandy loam. Flowering Period, July. Height, 3 ins.

S. Pumilio (Pygmy Catchfly).—Like *S. acaulis* in habit. Flowers rose coloured and large. Site sunny. Soil gritty. Flowering Period, May to June. Height, 2 ins.

S. quadrifida.—Like *S. alpestris*, but much smaller, in habit and flowers.

S. Saxifraga.—A tufted spreading plant. Flowers white, tinged with red beneath. Site sunny. Soil gritty loam. Flowering Period, May to August. Height, 6 ins.

S. virginica (Fire Pink).—This has rosettes of leaves and trailing stems. Flowers vivid crimson-scarlet. Site, half-shade. Soil deep, well-drained. Flowering Period, June to August. Height, 6 ins.

C. H. C., E. T. E., & W. I.

SILICATE OF POTASH.—See Potassium Silicate in *Potash and Potassium Compounds.*

SILICATE OF SODA.—See Sodium Silicate in *Soda and Sodium Compounds.*

SILK GRASS (*Yucca filamentosa*).—See *Yucca.*

SILK VINE (*Periploca graeca*).—See *Climbing and Trailing Plants.*

SILKY WILLOW (*Salix petiolaris sericea*).—See *Trees.*

SILPHA.—A genus of beetles of which the Beet Carrion Beetle is one.

SILPHIDÆ.—See Beet Carrion Beetle in *Insect Pests.*

SILPHIUM (Rosin Weed. Nat. Ord. Compositæ).—There are undoubtedly many better hardy perennial plants than the Silphiums, but as we should be much criticised by enthusiasts of hardy plants if the genus was omitted, we propose to describe a few species here, though for several others larger works must be consulted. The plants, which resemble Sunflowers in some respects, had some medicinal value in the olden days.

Culture.—No difficulty whatever in the culture of Silphiums will be found, given a garden soil of average quality and a sunny site. The taller sorts should be put well back in the herbaceous borders or, better still, relegated to the wild garden, where they make rather handsome subjects. Propagation is best effected by division of the rootstocks in the autumn or spring, at which times they may be successfully planted, and lovers of indoor flowers should note that the plants are useful for cutting.

What to Grow.—We recommend the following species as being the most suitable:—

Silphium albiflorum.—This is a pretty white sort blooming from July to September, and growing 3–5 ft. high,

---

[1] This is the well-known Alpine Catchfly.—Editor.

S. connatum.—Syn. *S. perfoliatum,* which see.

S. integrifolium.—This is the dwarfest species of all, and finds favour with many on that account. It bears yellow flowers from late July to September, and grows about 1 yd. in height.

S. laciniatum.—This is the comparatively well-known COMPASS PLANT bearing brilliant yellow flowers from June to October, and growing about 5 ft. high.

S. perfoliatum (Syn. *S. connatum*).—This is popularly known as the CAP PLANT. It bears attractive yellow flowers from July to September, and averages 4–7 ft. in height.

S. terebinthinaceum (PRAIRIE BURDOCK).—This and its variety *pinnatifidum* (Syn. *S. pinnatifidum*) are both somewhat coarse. They bear yellow flowers from June onwards right to the end of the autumn, and average 6–12 ft. in height.

SILVER BEET.—See *BEET, SEAKALE or SILVER.*

SILVER-BELL TREE (*Halesia tetraptera*).—See *SHRUBS.*

SILVER BERRY (*Elaeagnus argentea*). See *SHRUBS.*

SILVER BOX (*Buxus sempervirens*). See *SHRUBS.*

SILVER FERN (*Gymnogramme calomelanus* and *G. pulchella*).—See *FERNS AND FERN GARDENING.*

SILVER FIR (*Abies pectinata*).—See *TREES.*

SILVER LEAF.—See *DISEASES OF PLANTS.*

SILVER MAPLE (*Acer dasycarpum*). See *TREES.*

SILVER MILKMAID (*Ilex Aquifolium argentea medio-picta*).—See *HOLLY.*

SILVER QUEEN HOLLY (*Ilex Aquifolium argentea regina*). — See *HOLLY.*

SILVER SAND.—See *SAND.*

SILVER WEED (*Potentilla Anserina*). See footnote to article on *POTENTILLA.*

SILVER WHATTLE (*Acacia dealbata*). See *ACACIA.*

SILVERY CINQUEFOIL (*Potentilla argentea*).— See footnote to article on *POTENTILLA.*

SILVERY REED-GRASS (*Cortaderia conspicua*).—See *CORTADERIA.*

SILYBUM (Nat. Ord. Compositæ). This is a genus of Thistle-like, hardy biennials and perennials thriving anywhere. Unless the collection is very large, they may be dispensed with. *S. eburneum* (Syn. *S. hispanicum*) is the IVORY MILK THISTLE, while *S. marianum* is the common MILK THISTLE. Both bear purplish flowers in the autumn, and average 6–7 ft. in height.

SINGLE COLOUR BEDS.—See *COLOUR GARDENING: SINGLE COLOUR BEDS.*

SINGLE CORDONS.— See *CORDON FRUIT TREES.*

SINGLE ROSES.—See *ROSES FOR ALL PURPOSES.*

SIOUMI (*Daphniphyllum macropodum*).—See *SHRUBS.*

SIPHOCORYNE.—See under APPLE APHIDES in *INSECT PESTS.*

SISYMBRIUM (FLIX-WEED, GARLIC MUSTARD, HEDGE MUSTARD, LONDON ROCKET, etc. Nat. Ord. Cruciferæ).—A very large number of species of this genus have been described by plant collectors and botanists, but as the majority of them are of weedy appearance, and the few remaining are of doubtful hardiness, we do not propose describing them in the present edition of this work.

SISYRINCHIUM (SATIN FLOWER. Nat. Ord. Iridaceæ).—This is a genus of half-hardy and hardy perennials, but those of the former section are omitted, as we do not consider them of sufficient importance to describe. The hardy species are, however, very useful for the perennial border, rock border, and rock garden. They thrive in ordinary, light, rich garden soil to which vegetable mould has been rather copiously added, and may be propagated without much difficulty by offsets in March or April, and by summer-sown seeds in the usual way. We recommend the following :—

Sisyrinchium angustifolium (Syn. *S. gramineum*, also *S. Bermudianum* of some authorities).—This and its varieties *bellum* (Syn. *S. bellum*) and *Nuttallii* (Syn. *S. Nuttallii* of some authorities) bear blue flowers from May to June, and grow 6–9 ins. high.

S. Bermudianum (Syn. *S. iridioides*).—This, popularly called BLUE-EYED GRASS, bears blue flowers in June, and grows 12 ins. high.

S. gramineum.—Syn. *S. angustifolium* above.

S. grandiflorum.—This is one of the best border species, bearing large purple flowers from March to June, on plants 1 ft. high. Its variety *album* is pure white.

S. iridioides.—Syn. *S. Bermudianum* above.

S. striatum.—This is a useful yellow sort blooming in June, and averaging 1½ ft. in height.

SITE FOR A MARKET GARDEN.—See *MARKET GARDENING.*

SITE FOR ROCK GARDEN.—See *ROCK GARDEN : MAKING A.*

SITE FOR VEGETABLE GARDEN.—See *VEGETABLES : GENERAL CONSIDERATIONS.*

SITKA SPRUCE (*Picea sitchensis*).—See *TREES.*

SITONES.—See PEA AND BEAN WEEVILS in *INSECT PESTS.*

SIUM.—See *SKIRRET.*

SKELETON FRAME.—See *GARDEN FRAMES.*

SKELETON LEAVES.

Fine collections of these can easily be made if the leaves are first soaked in water till the green matter turns soft and putrid, and are then further soaked, after complete cleansing, in a gallon of water to which 30 teaspoonfuls of Chloride of Lime have been added. The first soaking may take several days, perhaps even a week; the latter will, however, serve its purpose in about twelve hours.

SKIMMIA.—For the best species see *SHRUBS.*

SKIRRET (*Sium Sisarum.* Nat. Ord. Umbelliferæ).—This is one of those vegetables which, although very popular among Orientals, find but little favour in this country. It is a true perennial, making very long fleshy roots, which are used in exactly the same way as Salsafy.

Culture.—The plant appears to flourish in any well-dug and properly drained soil, but in the preparation of this, rank or newly made manure should be avoided.

The seed may be sown early in spring where the crop is to mature, or in short drills in a rich bed to be afterwards transplanted. The distance between the rows should be not less than 12 ins., from 9–12 ins. being allowed between the plants in the rows.

Skirret appreciates a moist soil, and for this reason water should be liberally supplied during a hot season, or the roots are likely to lack size and table quality.

At the close of the growing season, a portion of the crop may be taken up and stored as advised elsewhere for *SALSAFY*, or if preferred all may remain in the ground until required for use, giving slight protection to the surface of the bed during very severe weather.—F. R. C.

SKULL CAP, or SKULLCAP (*Scutellaria galericulata*).—See *MEDICINAL HERBS* and *SCUTELLARIA.*

SKUNK GRAPE (*Vitis Labrusca*).—See *CLIMBING AND TRAILING PLANTS.*

SLATERS.—See under WOODLICE in *INSECT PESTS.*

SLAYER.—See HARMFUL FUNGI in *FUNGI: EDIBLE AND HARMFUL.*

SLEEPING DISEASE (of Tomatoes).—See *TOMATO DISEASES.*

SLENDER-FLOWERED THISTLE (*Carduus tenuiflorus*).—See *CARDUUS.*

SLIPPER-WORT.—A name applied to the genus *CALCEOLARIA.*

SLIPPERY ELM (*Ulmus fulva*).—See *TREES.*

SLOE (*Prunus spinosa*).—See *TREES.*

SLOW-ACTING FERTILISERS.—See *FERTILISERS: SLOW-ACTING.*

SLUGS AND SNAILS.

These are two of the gardener's greatest enemies. It is hard to believe the enormous amount of damage they can do, till one sees it. Nothing with a soft sappy stem or young succulent shoots is proof against their attacks, though some subjects are more susceptible than others. All the choicer perennials in the herbaceous border, as well as a great many young annuals when they are just appearing, are food for these creatures. In the vegetable garden, a large number of young crops, especially such as lettuces, spinach, endive, etc., are fair feeding-grounds for these pests.

Fortunately remedies for Slugs and Snails are not far to seek. All authorities agree as to the wisdom of dusting young plants in the spring freely and frequently with lime or soot to ward off these slimy creatures. Some sundriesmen supply rings of zinc to put round perennials, but when one has 10,000 plants or even more, this mode of protection ranks among the most troublesome, and is far too expensive. Choice plants can be "ringed" with ashes or lime, but it is necessary to apply more immediately after rain. Personally we do not favour spreading the ground with cabbage leaves in the hope of finding some of these pests lurking under them next week. We think this form of trap is very unsightly. There is on the market a patent slug and snail trap with which wonders have been done. On the whole, far the best way of clearing the ground of slugs is to dig some naphthalene soil fumigant into it in the autumn and a little more the following spring if need arises.—E.

See also *INSECT PESTS.*

SLUGWORM.—See *INSECT PESTS.*

SMALL APRICOT AND VINE MOTH. See *INSECT PESTS.*

SMALL BROWN SNAIL.—See under SLUGS AND SNAILS in *INSECT PESTS.*

SMALL BULRUSH (*Typha angustifolia*).—See *TYPHA.*

SMALL CATMINT (*Nepeta Nepetella*). See *CATMINT.*

SMALL COCKCHAFER.—See under CHAFERS in *INSECT PESTS.*

SMALL EARWIG.—See under EARWIGS in *INSECT PESTS.*

SMALL FRUITS.—See *KINDS OF CROPS.*

SMALL JONQUIL (*Narcissus odorus minor*).—See *NARCISSUS SPECIES.*

SMALL-LEAVED AZARA (*Azara microphylla*).—See *CLIMBING AND TRAILING PLANTS.*

SMALL-LEAVED HICKORY (*Carya alba*).—See *TREES.*

SMALL-LEAVED ROCK SPRAY (*Cotoneaster microphylla*).—See *CLIMBING AND TRAILING PLANTS.*

SMALL SNAKE MILLEPEDE.—See under MILLEPEDES in *INSECT PESTS.*

SMALL WHITE BUTTERFLY.—See under CABBAGE WHITE BUTTERFLIES in *INSECT PESTS.*

SMILACINA.—See *FALSE SOLOMON'S SEAL.*

SMILAX (Syn. *Myrsiphyllum.* Nat. Ord. Liliaceæ).—This is a handsome genus of greenhouse and hardy climbing plants with elegant foliage, which are largely used for cutting purposes. Suckers from the roots in little heat are the best modes of propagation. The best soil is rich, sandy loam, with a little peat or leaf-mould. Temperature needed, 45–55° F.

Greenhouse Species. — The two best of the many grown are:—

Smilax angustifolia. — Greenish-white. Fowers in August. Height, 6 ft.

S. asparagoides.—Greenish-white. Flowers in August. Height, 8–10 ft. This is the most popular species, on account of its long sprays of green foliage.

Hardy Perennial Species. — Not many are of much importance to us, but the species may be grown in the same way as other hardy climbers in ordinary, light, rich garden soil, and are best propagated by suckers.

Smilax aspera, *S. Bona-nox verbens*, *S. glauca* (the CARRION-FLOWER), *S. herbacea*, and *S. Sarsaparilla* (the plant producing the well-known "Sarsaparilla") are the best species. All bear greenish-white flowers in June and July, and range from 3–8 ft. in height. *S. rotundifolia*, the GREENBRIER or HORSE-BRIER, is too coarse for our purpose.

See also *CLIMBING AND TRAILING PLANTS*.

SMOKE BUSH (*Rhus cotinoides*). — See *SHRUBS*.

SMOOTH LUNGWORT.—See *MERTENSIA*.

SMOOTH ROCK SPLEENWORT (*Asplenium fontanum*).—See *FERNS AND FERN GARDENING*.

SMOOTH SUMACH (*Rhus glabra*).— See *SHRUBS*.

SMUT FUNGI.

The Smut Fungi form a natural group of parasitic fungi belonging to the orders Ustilagineæ and Tilletieæ, and are characterised by the production of a powdery mass of black spores. They are specially common in plants of the grass family (Gramineæ), and the world-wide damage they occasion in barley, maize, oats, and wheat amounts annually to several million pounds sterling. Amongst garden plants, with the exception of the Onion Smut (see article on *ONION DISEASES*), few smuts are really important, but mention may be made of *Ustilago violacea* in species of Dianthus, Lychnis, Saponaria, and Silene; *U. Scabiosae* in Scabious; *U. Vaillantii* in Scilla; *Urocystis Anemones* in Anemone, Hepatica, and Ranunculus; *U. Colchici* in Colchicum and Muscari; and *U. Violae* in Viola.

The mass of spores is produced in various parts of the plant. In some cases they occur as long black streaks in the leaves (Grasses, Leeks, Onions, and Sedges); in others as gall-like swellings on leaves, petioles, or flower-stalks (Anemone, Maize, and Viola). Spore-production may also take place in the flower, developing in the anthers instead of pollen (Lychnis and Silene), or destroying the ovary as in cereals, with a smutted or bunted ear of corn as the result.

A peculiar feature of smut diseases is that plants may be affected a very long time and yet continue to grow in a healthy manner; the mycelium of the parasite apparently causing little destruction of the tissues. The method of infection and the life-history varies considerably. In the majority of cases the plants concerned are annual, and infection may take place through flower, leaf, or root. In the case of several perennial plants the smut mycelium is perennial also, and hence the only remedy is the destruction of the plants. This applies to *Ustilago violacea* and *U. Vaillantii*. In the remainder of the flowering plants mentioned above the damage is rarely serious, and if affected leaves are picked off and the plants grown in a fresh site the disease usually disappears.—A. D. C.

SNAIL MEDICK (*Medicago scutellata*). See *MEDICAGO.*

SNAILS.—See *SLUGS AND SNAILS*, and see also under SLUGS AND SNAILS in *INSECT PESTS.*

SNAKE CUCUMBER.—A decorative Gourd. See *ORNAMENTAL GOURDS.*

SNAKE-ROOT.—See *OPHIORRHIZA.*

SNAKE'S-BEARD.—See *OPHIOPOGON.*

SNAKE'S-HEAD FRITILLARY (*Fritillaria Meleagris*).—See *FRITILLARY.*

SNAKE'S TONGUE FERN (*Lygodium japonicum*).—See *FERNS AND FERN GARDENING.*

SNAKEROOT.—See under BISTORT in *MEDICINAL HERBS.*

SNAKES.

The gardener has no use for snakes, which glide about so softly and silently among his plants. The common GRASS SNAKE is, of course, quite harmless, but this cannot be said of the ADDER or VIPER. Bites from this latter snake often have serious consequences, especially if the gardener happens to be a little run down at the time, and when working among herbaceous plants in districts where these snakes are common it is difficult to avoid being bitten. The best treatment is to wash the bite at once, and tie a bandage very tightly above the place to avoid the poison circulating. Medical advice should then be obtained without delay.

SNAKEWEED.—See under BISTORT in *MEDICINAL HERBS.*

SNAPDRAGON.—See *ANTIRRHINUM.*

SNEEZEWORT.—See *HELENIUM.*

SNOW FLIES.—See under CABBAGE WHITE FLY in *INSECT PESTS.*

SNOW AND GARDENING.

If snow is dug into any soil, save the very lightest, much harm will be done, the soil being chilled and rendered unsuitable for sowing or planting for a long period. Trees and shrubs should, as a general rule, be left untouched so far as adhering snow is concerned, except where the fall is so heavy that they may be damaged, in which case it should be shaken off.

SNOW IN SUMMER.—This is one of the names applied to *CERASTIUM*, which see.

SNOWBALL TREE (*Viburnum Opulus sterile*).—See *SHRUBS.*

SNOWBERRY.—The genus SYMPHORICARPUS and *S. racemosus.* See *SHRUBS.*

SNOWDRIFT (*Arabis albida fl. pl.*). See *ARABIS.*

SNOWDROP (*Galanthus.* Nat. Ord. Amaryllidaceæ).—Everyone knows the Snowdrop. Although autumn flowering varieties and large, early spring flowering varieties are now to be had, it is doubtful if any of them have the charm of the old *Galanthus nivalis* in its single blessedness. No one seems to want the autumn kinds. They are out of place then, except from a collector's point of view. Those who "go in" for them have found a great many beautiful forms, but their beauties require close observation to be seen, and for practical garden purposes may be ignored.

Culture.—Any good garden soil suits Snowdrops. They do well in grass which is not too rank, and are ideal for clothing the ground in thin woodlands. They are too soon over when grown in pots, unless grown all the time in a cold frame, and even then they are often disappointing. Snowdrops dislike being out of the ground for a long time, hence early planting, before the end of September at the latest, is a *sine qua non* in their culture.

What to Grow. — *Galanthus Elwesii.*—This is generally larger than our old *Galanthus nivalis.* Its flowers are white, with inner segments marked with rich green. They are borne in February, on plants 6–9 ins. high.

G. Ikariae. — This has glossy foliage, and white globular flowers in March. Its height is 6–9 ins.

G. Imperati.—This has large white flowers, with inner segments marked green. It blooms in March, and grows 9 ins. high. Its variety *Atkinsoni* is very useful.

G. nivalis.—This is the COMMON SNOWDROP, or old ENGLISH SNOWDROP, with its charming white flowers. It has a tendency to become double in good soil. Height, 6 ins.

G. nivalis flore pleno.—The double form of the above.

G. plicatus.—This, the CRIMEAN SNOWDROP or PLAITED SNOWDROP, has broad, plicate foliage, white flowers, and is taller than the general run of Snowdrops. Height, 9–12 ins.
J. J. & E. T. E.

SNOWDROP ANEMONE (*Anemone sylvestris*).—See *ANEMONE*.

SNOWDROP TREE.—The genus HALESIA and *H. tetraptera*. See *SHRUBS*.

SNOWDROP WINDFLOWER.—The Kew name of *Anemone sylvestris*. See *ANEMONE*.

SNOWFLAKE (*Leucojum*. Nat. Ord. Amaryllidaceæ).—The best way to describe these flowers is to say they look like giant snowdrops on stilts. They are excellent for cutting, and make a good display either in a border or in a thin woodland. They also do quite well in grass, which must not be mown until their leaves begin to die down.

Culture. — Snowflakes may be grown to perfection in any ordinary, good garden soil. They dislike being disturbed, hence they never or seldom do themselves justice at their first time of flowering after being newly planted. Clumps may be left from six to eight years without disturbance. Bulbs should not be kept out of the ground any longer than is absolutely necessary. The summer flowering variety (*L. aestivum*) does well as a semi-aquatic.

Species and Varieties :—*Leucojum aestivum* (SUMMER SNOWFLAKE).—This bears white flowers, with green spots at lips of the petals, in May, and ranges from 12–18 ins. in height.

L. autumnale.—This, a useful subject for the rock garden, bears white flowers tinted with red in the early spring, on plants 3–9 ins. high.

L. vernum (SPRING SNOWFLAKE).—This is similar to the above, but blooms in March or early April, and grows 9–12 ins. in height.

L. vernum carpaticum is a larger and very distinct form of *L. vernum*. The spots on the ends of the petals are a pretty canary colour, instead of being green as in the type. Old-established plants will produce two or three flowers on a stem. Height, 12–15 ins.—J. J. & E. T. E.

SNOWTREE (*Pyrus nivalis*).—See *TREES*.

SOAP WASHES : Their Use in the Garden.—A very important class of garden spraying material employs Soft Soap as a basis. The exceptions are fungicides having a metallic (usually copper) or sulphur base, and " poisons " for the destruction of " biting " insects. Practically all other washes are for the control of " sucking " insects of which the various forms of Aphis (Green Fly, Black Dolphin etc.) and Psylla (Apple Sucker) are typical. Such insects we may say are not provided with lungs, their functions corresponding to breathing being exercised through their skins. When completely sprayed with a Soft Soap solution they are enveloped in a gelatinous film which suffocates them. To make their destruction doubly certain it is customary to embody some form of vegetable poison in Soft Soap washes such as Nicotine or Quassia. A vigorous pest rids itself of its asphyxiating envelope if the strength is insufficient, but if the material is accompanied by a poison its efforts to do so are immediately paralysed.

Such poisons are in themselves sufficient to kill pests but mixed with plain water they will not effectively "wet" a plant's leaves. By examination under the microscope the liquor will be found to remain in isolated globules on the hairs or greasy surface of the leaf, and in this form is found quite ineffective as an insect poison. Further, the liquor exhibits a tendency to roll off the leaf much as quicksilver will roll on a plate without wetting it. The addition of Soft Soap, however, gives the liquor a complete covering power; it will thoroughly wet the leaf and leave no part of it and no insect thereon unenveloped. The covering or spreading power of the soap is therefore an additional and essential function.

The effective power of soap in a spray is bound up with the quality of the water. A soap solution added to hard water will first create milkiness in the water, in forming insoluble metallic soap, but pure soap dissolved in pure soft water will give a clear solution. Further additions of soap to hard water will result in the formation of a scum on the surface of the water, and even, in extreme cases of hardness, will throw down a precipitate. As long as any such action takes place, that is to say, that until all the lime or magnesia salts to be acted on are "killed," none of the soap used plays any useful part as a spraying material. The presence of unchanged soap in the water after this action is complete is indicated by its power of forming a "lather" on agitation. When increasing quantities of soap are added to such water, at first no evidence of lather is produced. On further addition of soap, signs of lather observed on agitation will quickly die down, and finally when sufficient soap has been added a "permanent" lather will be produced, which is technically considered as the character of lather which will not die down within five minutes by the clock. The production of such a lather is a sure indication that the water has been thoroughly softened. At this stage a suitable further quantity of soap has to be added to provide the necessary character of lather indicating efficient strength for spraying purposes. This quantity may be represented by 4½ lb. per 100 gals. of original soft (*e.g.* rain) water, or approximately two-thirds of an oz. per gal. Hard waters commonly occurring in this country require a further 2, 4, 6 lb., or even in extreme cases 10 lb., per 100 gals., meaning from say half as much again to twice as much again. Waters requiring more than the highest figure are very rarely met with.

It will thus be seen that there is a great danger of inefficient results from spraying if the character of the water employed is not taken into account. It makes for economy to use rain water as far as possible, and if this is available the minimum quantity of spraying material is required, which must be increased for harder waters. A good working test is the character of the lather, which should be of a very thick creamy nature.

With regard to applying spraying fluids with a soap basis, it will be clear from what has been said above that the insects must not only be actually reached but *entirely enveloped.* Owing to the protecting cover afforded by intervening leaves, the general instructions as to using heavy drenching sprays are not in themselves sufficient to ensure effective results. What is essential is that a "mist" must be produced entirely enveloping the foliage to be sprayed. Knowing how extremely wetting a "Scotch mist" is, it will be realised that this form of spray will ensure absolute wetting of other parts of a plant irrespective of whether they intervene in each other's path and protect each other. To ensure this form of spray, a modern mist-producing nozzle must be employed on the pump. An ordinary garden rose is practically useless. Furthermore it will be found that the higher the pressure employed, the more effective the spray, and it is strongly recommended that, in all except the smallest gardens, a proper spraying apparatus furnished with a pressure gauge and holding from 4 to 40 gals. of spraying wash be employed. Simpler forms are apt to prove very fatiguing in use, and in practice the necessary pressure is not continuously maintained throughout the spraying operation.—Y. M. C. L.

[See also articles on *INSECT PESTS: GENERAL METHODS OF DESTRUCTION; SPRAYING MIXTURES AND FUNGICIDES;* and *QUASSIA.*—EDITOR.]

SOAPWORT.—See *SAPONARIA.*

SOBRALIA.—See *ORCHIDS.*

SOCIAL PEAR SAWFLY.—See *INSECT PESTS.*

SODA AND SODIUM COMPOUNDS.

Though soda is not one of the four essential elements for successful plant growth, and thus cannot be said to be of nearly so great importance as potash, yet, seeing that many plants contain it and indeed require it, we must briefly consider it and its salts. Modern chemistry has shown soda to have a secondary action previously not dreamt of, namely, it can break up insoluble potash compounds such as clays, and change places with the potash, thus liberating it for the use of our crops. It is probable that the advantage resulting from the application of soda is due much more to this chemical change than to the fertilising value of the soda itself, though it must be admitted that a heavy dressing of salt on strong land renders this too sticky to work for some time.

Forms of Soda.—If the gardener looks down a chemical list he will see "Soda—see Sodium," and if he glances at the list of sodium compounds he will, as in the case of Potash and Potassium Compounds, be struck by the great number there are. However, only half a dozen or so of these are useful to him, and all save two of the nine compounds of soda we shall describe are used as fertilisers. As regards natural forms of soda, we mentioned in the article on *POTASH* that Kainit contains it, in the form of common salt (*Sodium Chloride*). In Bolivia, Chile, and Peru there is a deposit known as CALICHE which is sodium nitrate mixed with such impurities as sulphate of lime, sulphate of soda, iodate of soda, and ordinary salt. Probably the best known to the gardener of all forms of soda is rock or ordinary salt (*Sodium Chloride*). Seaweed and sea sand also contain soda salts.

Application of Soda. — If the chemical action referred to above is desired to be applied to the garden soil, then the soda must be applied in some cheap form in the early winter. Carbonate of soda and sulphate of soda are perhaps the best for winter application, the others (excepting the hydroxide and hydrogen sulphate, which are not, as we shall see, fertilisers) should be used in the spring and summer. With regard to soda-loving crops we may name tap-rooted crops such as beet, carrots, parsnips; plants of the great cabbage family including kohl rabi and seakale; and stem crops such as celery and leeks, and, of course, asparagus. Crops which are not specially fond of it include peas and beans: crops which strongly dislike salt include potatoes, and of surface crops which appreciate it we may mention spinach and spinach beet. A flower which abhors it is the hollyhock; there are as a matter of fact very few flowers that enjoy much in the way of soda, though they may have weak drinks of phosphate or nitrate of soda occasionally. The effect of summer used soda compounds is to stimulate growth and especially leaf growth.

SODIUM CARBONATE.—This is the first soda compound we need mention. It is not of great value but can be used for digging into the soil in the winter at the rate of 2–3 oz. per sq. yd. Incidentally we may mention that it is an essential ingredient of Burgundy Mixture used for spraying potatoes. Its other use is one of a very different kind. Who has not heard of using washing soda or soda-ash with plenty of hot soapy water for cleaning glass of frames with? As a dressing for onions it is of considerable value; the crushed soda is used at the rate of 1–2 oz. per sq. yd. in wet weather during the growing season.

SODIUM CHLORIDE.—This in its impure form is common table salt of which the gardener's young folks have to "eat another peck before they will be grown up into men and women." Agricultural salt is the usual form this comes in, and this should nearly all dissolve in water when a sample is tested. If much remains undissolved, you are probably paying for the cheaper Gypsum (sulphate of lime). Salt is useful for asparagus beds. One or two ounces per square yard may be scattered over the bed in early April and the same dressing repeated if possible immediately before rain, three weeks or a month later, As a fertiliser for other crops salt can be hoed in at the rate of 1 oz. per sq. yd. during the growing season. Salt is one of the few effectual cures for Clubroot Disease. For this, a peck of salt and about 2 pecks of lime should be forked into each square rod of very badly infected ground a few weeks before planting. Less can be used for milder cases. Salt water can be used as a stimulant (1 oz. per gal.), but nitrate of soda is better. Salt is poisonous to pigs.

SODIUM CYANIDE. — This is cyanide of soda, the equivalent and equally poisonous salt of soda to the potash compound which was described in the article on *Potash.* Sodium Cyanide can be used in the same way and for the same purpose.

SODIUM HYDROGEN SULPHATE.—This is sometimes known by the names of Sodium Bisulphate or sodium acid sulphate. Its uses to the gardener are two in number; firstly, it being a poisonous corrosive compound it makes a wonderful weed killer. For this purpose a strong solution of it is made with hot water and this is applied to weedy garden paths, etc. in dry, hot, summer weather. A second application is rarely necessary unless rain falls immediately afterwards. Secondly, it can be used as a means of dissolving bones. The bones are first of all crushed and two parts by weight are mixed with one part by weight of this sodium sulphate. The whole is then well sprayed with water and allowed to digest for several days. After this the material is turned over with a shovel, put through a riddle, and stood in a dry place till required for use. This sulphate is largely produced in hydrochloric acid factories where it goes by the name of salt cake. It is also produced in the manufacture of nitric acid from Chile Saltpetre or nitrate of soda, and is then known as nitre cake.

SODIUM HYDROXIDE.—This is caustic soda. It is very burning if it gets on hands or clothes, very few people being able to touch the chemical without their fingers getting burnt. Like caustic potash it can be and is freely used for making up caustic winter washes, and it should be stored in the same way as that chemical.

SODIUM NITRATE is another name for Chile Saltpetre or nitrate of soda. It is a well-known nitrogen fertiliser very quick in its action, and encourages leaf at the expense of fruit or flowers. When crops require to be hastened on, such as is needed in the case of a threatened pest attack, few chemicals are so good as nitrate of soda (excepting of course nitrate of ammonia). It can be hoed into the ground among growing crops at the rate of 1 oz. per 9 sq. ft., or applied in water at the rate of ½ oz. per gallon. The liquid must not touch the foliage of the plants. Nitrate of soda being very soluble in water and easily wasted should never be applied in the winter or no trace of it will be left by next spring. It way be well to point out that nitrate of soda is poison to animals.

A matter of interest to gardeners is the fact that nitrate of soda can be used for making nitrate of potash, which is so much more valuable (see article on *Potash*). Crude chloride of potash can generally be obtained when nitrate of potash is at famine prices,[1] and all we need is a supply of this, some nitrate of soda, a simple contrivance for filtering, and some hot water. To 1 pt. by weight of nitrate of soda add 1½ pts. by weight of boiling water. Next a similar solution of potassium chloride (1 : 3) is made and the two liquids mixed. Salt settles and is filtered off. After this all we need do is to evaporate the liquid till only half of it remains and filter off more salt. The liquid that remains is then all evaporated off and the nitrate of potash stored in tins. It can be further purified if necessary.

Nitrate of soda is at times sold in a very impure condition. Salt is the most common adulterant. This can be discovered by the same method as that described under nitrate of potash in the article on *Potash*. See also article on *Manures*.

SODIUM PHOSPHATE. — The normal phosphate of soda is the only one which concerns us in the present article. It is not nearly so good as phosphate of potash, but it can be used as a stimulant occasionally at the rate of 1 oz. per 2 gals. of water.

SODIUM SILICATE.—Aqueous solutions of this and Potassium Silicate are known as Water Glass. The liquid or semi-solid is often handed on to gardeners after eggs have been preserved in it, but as noted in our companion article on *Potash* it is of very little value.

SODIUM SULPHATE. — Probably the gardener will be struck by the similarity of this to the Glauber's Salts he takes from time to time as a medicine. And no wonder, since the commercial sulphate is an impure form of Glauber's Salt. It is not a largely used chemical or of special value, but can be used occasionally as a stimulant at the rate of 1 oz. in 2–3 gals. of water, or hoed in during the growing season at the rate of 1 oz. per sq. yd. It may be interesting to remark that in large doses it is poisonous to plant life, and that a soil can easily be rendered unfertile by dosing it with this chemical. Some of the deserts abroad owe their barrenness almost entirely to the presence of quantities of sodium sulphate.

---

[1] This was the case when the present article was written.—Editor.

E. T. E.

[This last compound is produced in some quantity by heating nitrate of soda with sulphuric acid in the manufacture of nitric acid. It represents one reaction further than when acid sodium sulphate is produced in preparing this acid. It also is known as Nitre Cake, but the name should be reserved in our opinion for the acid salt.—EDITOR.]

SOFT FRUITS.—See *KINDS OF CROPS*.

SOFT GRASS.—See *HOLCUS*.

SOFT PRICKLY SHIELD FERN (*Aspidium angulare*).—See *FERNS AND FERN GARDENING*.

SOFT VIPER'S GRASS (*Scorzonera mollis*).—See *VIPER'S GRASS*.

SOIL: BURNING.—See BURNING SOIL in *SOIL STERILISATION*.

SOIL CULTIVATION.

The various modes of digging or turning the soil, namely, single and double digging, ridging, etc., have for their object: (1) the mechanical breaking up and loosening of the earth; (2) the letting in of air to sweeten and fertilise it; and (3) the incorporation of manures with its substance. The depth to which this process is carried is a most important point of cultivation, and no surface-culture or feeding can replace the possession of a root-run of say 3 ft. or 4 ft. Depth in digging is generally measured by the number of "spits" or lengths of the spade-blade.

Single digging consists in turning the soil over one spit deep. The spade is driven in nearly upright, and the earth lifted and turned upside down *in situ*. This is sufficient where the ground is in good condition and fairly clear of weeds: it is a good preparation for planting or sowing when the land has been given a winter tillage and left rough until the spring. Further, it is the best method of working in manures of a light or powdery character, such as soot, wood ashes, or lime, which are to be scattered evenly over the surface and then turned in. Stable manure, in a "short" or half-rotted state, may also be dug in thus; but "long" or strawy litter is not so manageable. Though plain digging has various uses, most garden soils require a more thorough treatment preparatory to their cropping, and for all strong-growing and long-standing crops, trenching, as distinguished from ordinary digging, is necessary. In trenching, instead of turning over one depth of the spade, we may go two, three, or even four spades deep, if the quality of the lower strata permits.

Trenching.—The principle of trenching is this: a trench is first dug across one end of the plot to be dealt with: its width must be at least as great as its depth. This is then filled up with mould thrown forward from a second trench immediately adjoining the first: the second in turn is filled from a third, and so on in succession until the whole piece has been turned over to the desired depth. If the whole body of the soil be uniformly good in quality, the lower stratum, to a depth of 2 ft. or 3 ft., may be brought up to the surface; but as a general rule, the lower layers of soil are comparatively raw, sour, and unfertile, and should not be superimposed on the top spit which has been mellowed by atmosphere and the deposit of humus or the decay of vegetable matter. Two spits of fertile soil is an average depth, and is capable of excellent results; three is a precious possession. The stratum below this is generally called the *subsoil*; in trenching it should not be brought nearer the surface; but should be thoroughly broken up and aerated, and may have some manure worked into it; but it should be left in position at the bottom of the trench. This process, commonly called mock or *bastard-trenching*, is the most generally useful for all but the exceptionally deep and fertile soils.

How to Trench a Plot.—The ordinary method of trenching a small plot is to dig out a trench across one end of it, at right angles to its length, and wheel the excavated earth to the other end, where it is laid in a heap, ready to fill in the last trench when the piece is finished. In dealing with large pieces of ground—say, anything beyond 6 × 10 yds.—it is better to divide the surface into two equal parts lengthways, marking the division by a line or by pegs. The trench is then opened across the end of one of the halves, and the earth is merely thrown in a heap to the right or left on the other section. Trench straight down the first piece till the end is reached; then face about and dig a trench across the second, throwing the soil from this trench into the last trench of the first section. Continue trenching back along the second until it is finished; the last trench being filled up with the earth from the first trench of all, which was thrown on one side at the start. This method saves a great deal of wheelbarrow work and shifting of heavy soil to a distance. In digging the trench, keep its sides nearly vertical, and maintain the same depth and width all through the work, measuring these from time to time with a stick, unless the eye can be trusted for an accurate estimate. In bastard-trenching—one good spit turned over and the subsoil well broken up—the trench may be conveniently 2 ft. 6 ins. across. In real trenching, two spades deep or more, 3–4 ft. will be necessary.

In digging, the size of the clod of earth lifted by the spade should be governed by the purpose for which the ground is required. In "digging down" or "digging fine" in order to form a tilth for sowing or planting at an early date, small spadefuls should be taken, and lumps should be chopped up and knocked in pieces with the blade, ridges and hollows being levelled as the work proceeds. For breaking down previously-dug soil, a fork or a "Canterbury" hoe with three prongs is often more handy than a spade.

Rough Digging and Ridging.—In "digging rough" when the ground is to lie fallow for some time, the clods should be as large and rough as possible. On really heavy soils "ridging" is desirable. By this plan the ground is dug in a series of rough trenches, or furrows, the earth taken out of each trench being thrown up on the strip of soil lying next to it, so that the plot is covered with parallel ridges, sloping to a sharp edge, and intervening hollows. This exposes a larger surface to the weather, and will bring the stiffest clays, after the winter's frost, into a friable state by sowing-time.

It is true economy to get a really good spade, and the full price for the best grade should be paid. The tool should be well-balanced and "handy." For trenching and heavy land it should be full-sized and strongly made: a lighter pattern is useful for mixing composts, making seed-beds, etc. In dealing with stony subsoils or large tree roots which may be encountered in trenching, a pickaxe or mattock may be required.

The addition of manure is most conveniently made in the process of trenching or digging. For all deep-rooting and hungry crops it is important to manure not only the upper, but the bottom layers of the soil. The manure should be wheeled on to the ground while the surface is dry, or during frosty weather, and should be laid in heaps just clear of the strip to be dug or trenched, so as to avoid treading on it during the work. A layer of dung about 2–3 ins. thick is laid on the bottom of each trench, and roughly turned into the subsoil. Shave off a couple of inches from the surface of the next width of ground, and throw it, upside down, on top of the manured trench, thus burying all weeds, etc., safely out of harm's way. A second layer of manure is now spread on the partly-filled trench, and even a third before it is entirely filled from the succeeding trench. In this way the manure is, to some extent, distributed through the body of the soil, instead of being compressed, as it too often is, into one thin stratum at the bottom of the trench. It is well, for the generality of crops, and particularly for seed-beds, to see that there is no solid manure within the uppermost 3 ins. or 4 ins. of the soil. Stones, roots, perennial weeds, and all rubbish should be thrown out as they are met with, and taken away.

It is all-important that digging and trenching should only be done when the ground is in a suitable state. If the surface is wet after rain, or frozen, or muddy from thaw or melted snow, it is worse than useless to attempt to work on it. The right condition between wet and dry can only be learned by experience; but a good deal depends upon the nature of the soil. A light or sandy loam, with good natural drainage, may be workable the day after heavy rain; while retentive clays may need a week of fine weather to make them negotiable.

Surface Cultivation is almost as important as deep stirring of the ground. The tool chiefly employed for this purpose is the Dutch hoe. This should be kept going in dry weather all through the growing season: it is invaluable for aerating the soil and preventing it caking. A tool with an 8-inch blade should be used for open ground and wide rows; one of 2 ins. or 3 ins. is necessary for work among seedlings. For making drills for small seeds by far the best implement is the "triangular hoe"—a plate of steel with three sharp angles fixed at the end of a handle.

Light soils frequently need consolidating, which is, as a rule, best done by careful treading of the surface, when it is fairly dry. After the ground is made firm, it should be lightly gone over with the flat hoe, to make a "crumb" on the top.

Raking is the operation of clearing off stones, rubbish, and clods of soil from the surface of beds prepared for seeds or planting; it may also be used to some extent for minor levelling of inequalities. It should never be used merely to give a neat finish to plots, as the tilth which it leaves is not nearly so wholesome for plants as the rougher result of the flat or Dutch hoe. See also article on *GARDEN TOOLS*.—J. H.

SOIL FOR BORDERS: Amount Required.—See under VOLUMES in *ARITHMETIC AND GARDENING*.

SOIL FOR CACTI.—See *CACTI*.

SOIL FOR ORCHARDS.—See *ORCHARDS: MAKING AND MANAGEMENT OF*.

SOIL FOR WILD GARDEN.—See *WILD GARDENING*.

SOIL FUMIGATING.

The question of soil fumigating is one upon which there are many opinions, and some confusion exists as to the exact meaning of the term. It is used loosely to imply the clearing of the soil of both pests and diseases, but if diseases such as Clubroot or Wart Disease are to be cleared, usually the material must be applied in much greater quantities Strictly speaking, soil fumigating should be limited to the clearing of the soil of pests, leaving the matter of diseases, many of which require special treatment, to him who has studied diseases.

Taking this as our limitation, we find that there are many chemicals which can be applied for the clearing of the ground pests, and before we proceed to describe their use individually, we give a brief warning which may be useful. This is that soil fumigants should be used as early in the winter as possible, to get the ground thoroughly cleared before the spring, since if they are used shortly before seeds are sown, they may prove detrimental to the young plants and stunt the growth of food crops.

Carbide Refuse.—The first soil fumigant about which we must speak is known as spent carbide or carbide refuse. Every gardener knows that it is produced from acetylene gas plant, but very few know of the great value of this residue as a soil fumigant. Dug in during the autumn or winter it will clear the ground of many of the smaller soil pests, but it should not be relied upon where the ground is full of wireworms. About 1 lb. per sq. yd., or a little less, is a suitable dressing. The rock carbide itself is too violent and dangerous for use.

Carbolic Acid.—This is, as most gardeners know, an extremely corrosive liquid used by the medical man in the case of infectious illnesses. It is, however, of great value as a soil fumigant provided that the dressing is not too strong. Being a liquid, its application is somewhat awkward, and it has to be applied to the infected ground by means of a watering-can. The quantity to apply is a matter of opinion, but for a 36-gal. barrel of water 3 pints of concentrated acid will be quite enough. This liquid is extremely poisonous, so it should all be used up, as if any is left lying about it may be mistaken for water and an accident happen. The strong acid will cause severe wounds in contact with naked flesh. In the case of ground which is very full of soil pests at least 30 gals. of this solution for each sq. rod will be required, and the ground should be immediately forked over, or, better still, trenched to the depth of 15 ins. after application.

Carbon Bisulphide.[1]—This is a soil fumigant which is comparatively little used on account of its dangerous nature. There is no doubt of it being highly effective when properly used, but very great caution must be exercised, and nothing should be planted on the ground for at least two months after an application. The best way to apply it is to peg holes all over the ground about 6–12 ins. apart, and at least 7 ins. deep. A little of the bisulphide, which is an oily liquid, is dropped into each hole, the ground being immediately raked over, and, if possible, covered with boards. This chemical, however, is highly inflammable, and areas treated with it have been known to catch fire even by means of a passing spark from the gardener's pipe. There is no doubt, however, that it entirely kills all soil pests, and if the ground is terribly ridden with these enemies of the gardener they can be completely got rid of by its use.

---

[1] Chemists call this *Carbon Disulphide*.—Editor.

Flue Dust.—Fresh flue dust is of great value as a soil fumigant on account of the poisonous gases related to Cyanogen that it contains. Of late flue dust has come to the front as a fertiliser, but it is not safe to use it fresh, as the gas it evolves in the soil will kill plants as well as pests. If, however, it is applied in early November, or at the latest in December, at the rate of about 1 ton for every 300 sq. yds. of ground and forked in at once, all soil pests will speedily die, and the ground will thus be thoroughly purified in time for sowing or planting in March. Recently we were advised to mix it with sewage, and so long as the material is applied early, fresh flue dust may well be mixed with it, but if it is to be used as manure for light soils in the spring the flue dust should be old, otherwise it will be too dangerous to use.

Formaline.—This too is a liquid, but it is highly effective as a soil fumigant. Being very strong and quick to evaporate, however, the gardener must be careful when using it, and any vessel containing the strong solution should be opened out of doors to avoid any possibilities of asphyxiation. If the best formaline is obtained, about 1 qt. to every 20 gals. of water should be used, so that for a 40-gal. cask 2 qts. or ½ gal. will be required. The liquid, after being thoroughly stirred with a wooden pole, should be applied to the infected ground with a watering-can, and great care should be taken not to water more ground than can be turned over in one day. As the gas given off is very irritating to the eyes, nose, and throat, gardeners should protect themselves in some way, or, if possible, borrow an old gas-mask from a soldier who has served in Flanders.

Gaslime. — This is the next material about which we must speak, as it is exceedingly effective as a soil fumigant. It is to be regretted that gas is now purified in all up-to-date works by oxide of iron instead of with lime, for the consequence is that little gaslime is now available. Where, however, gas is still purified in the old-fashioned way, and the soil is full of pests, full advantage should be taken of the gaslime, by using it on the ground. Certainly no solid chemical could smell so foul, or more foul, and few liquids can beat gaslime in its odour, except, of course, ammonium sulphide, but the gardener does not think of this when the soil is teeming with wireworms, millepedes, leather jackets, and all other soil pests which greedily devour his crops. Opinions differ as to the amount of gaslime to apply, but personally we believe in doing the thing thoroughly if at all. One gardening writer said the other day that it was the greatest possible danger to apply more than ¼ lb. of gaslime to every sq. yd. of ground, but we believe in putting on 1 lb. to that area, and digging it in at once. It is advisable, however, that the gaslime should be applied as early as possible in November, and certainly not later than the end of December if the soil is to be in a fit state for the receipt of seeds by March. The foolish practice of sprinkling it on the land a month before digging in should not be followed.

Naphthalene.—Many proprietary soil fumigants sold at a price grossly exceeding their cost, consist largely of naphthalene united with some suitable base, such as lime. As, however, naphthalene is much cheaper than any proprietary soil fumigant in industrial districts where coal is distilled, advantage should be taken of this, and the naphthalene used. Professor Theobald recommends from 2 cwt. to 3 cwt. of naphthalene to be applied to the acre, which works out at from 1 lb. to 2 lb. per sq. rod. Various additions to naphthalene have been suggested from time to time, such as lime, salt, soot, and permanganate of potash, and one soil fumigant which the writer has invented consists of a mixture of one part lime, one-quarter part salt, and one-eighth part naphthalene. This formula has been published previously for the use of allotment gardeners, and as it has not been registered or put on the market anyone can make it. Its effectiveness for destroying soil pests has been proved to be great.

The main thing to observe in the use of naphthalene, as in most other soil fumigants, is to get the material on the ground and under the ground as early as possible. The gas given off by naphthalene is inflammable, but not so highly inflammable as that of carbon bisulphide. However, it does not do to let the material go off in gaseous form, for much of its effect lies in the searching nature of its gas. So that if it is necessary to store naphthalene for any period, it should be covered with powdered quicklime or stored in air-tight tins. Various mixtures of naphthalene can be used at the rate of ¼ lb. per sq. yd., and it is extremely foolish to spread them on the surface of the ground, as many authorities advise, and dig in a week or two later, for by that time nothing but dross will be left.

Salt.—Ordinary common salt has some value as a soil fumigant, though this is not great. It is chiefly useful for killing surface soil pests and slugs, but if dug into the soil at the rate of 2–4 oz. per sq. yd. it will render this distasteful for many soil pests. However, where anything stronger can be obtained, salt should not be relied upon, for it is more of a fertiliser than a soil fumigant.

Soot.—This too is a mild soil fumigant, but it should not be relied upon. Fresh soot is more effective for the purpose than old soot, but it must not be dusted over plants or it will burn them. Fresh soot can be dug into the ground in the early winter at the rate of about 20 lb. to the sq. rod. It is, of course, difficult to apply, for if there is a slight wind much of it will be blown away. Soot mixed with lime is said to be effective as a soil fumigant on account of the ammonia gas given off, but we prefer naphthalene or something stronger.

Tar.—It very often happens that the asphalters fail to estimate exactly the proportion of fine asphalt needed to cover any one or other of the garden paths, and they leave half a hundredweight or so in a heap behind the tool shed, as it is not worth while carting it away. Rather than let this material go to waste the gardener should spread it on his land, and dig it in as early in the winter as possible. The idea that this material will kill the plants is a popular fallacy, and has no foundation in fact, as from experiments personally made by the writer it had no detrimental effect. As regards its value as a soil fumigant it is worthy of much praise, for the gas given off from the tar means death to all soil pests. It is, of course, difficult exactly to say how much to apply to any area, as this depends upon the amount of moisture present, but in the writer's experiments he spread the material over the ground in a very thin layer, and dug it in a few weeks later.

There are many other chemicals which find small application as soil fumigants, but with these the gardener need not bother, as most of them are too expensive and too dangerous for general application.

E.

SOIL FUNGICIDES.—See *SPRAYING MIXTURES AND FUNGICIDES.*

SOIL IMPROVEMENT.

To a great extent this is a question of soil working, and to understand the subject of soil working it is necessary that we first of all devote attention to draining, digging, trenching, and especially bastard-trenching. For particulars of how to carry out these operations reference should be made to our articles on *DRAINING* and *SOIL CULTIVATION.*

But besides soil cultivation there are other modes of improvement. The chief of these we mention briefly below :—

Liming.—This is of the greatest importance, and since ground lime can be had cheaply in many districts, allotment holders, and indeed all gardeners, should go in for it extensively. Lime acts like magic as a soil improver, especially on stiff clay, and it quickly leads to a great increase in production. January and February are admittedly the best months for this mode of soil improvement, for fuller details of which reference should be made to our article on *LIME.* It must be noted here, however, that gaslime, often regarded as a soil improver, contains poisonous compounds of sulphur, and should only be applied as a means of killing pests.

Applying Chalk.—It may be mentioned that chalk is much milder in its action than lime, and it is particularly useful for improving light soils or sandy loams. Powdered chalk, not lump, should be used, and it is safe to apply at least 56 lb. to the sq. rod.

Manures.—Of course the best method of soil improvement is by the frequent application of suitable manures and fertilisers, but the *exclusive* use of artificials will end not in improvement, but in soil exhaustion. Artificial fertilisers should be used in conjunction with humus, otherwise the soil will be impoverished. Farm and stable manure are difficult to obtain, but vegetable refuse, including leaves and green manuring (see below), will afford a good basis on which to apply superphosphate of lime and other artificial manures. Light soils in particular are left poorer instead of being improved by the constant use of artificial manures without some form of organic manure, and full particulars as to how to make the material will be found in our article on *VEGETABLE MATTER.*

Green Manuring.—Another splendid way of soil improvement is found in green manuring, and it is safe to assume that this will be far more extensively adopted than it ever has been in the past. To make up for the lack of humus, especially in light sandy soils, quick-growing crops, such as Mustard, Rape, Rye, and, better still, Vetches are drilled in or sown broadcast after clearing the ground, say in late August or September and dug into the ground when green. If a soil is very poor in organic matter, and most light soils are, the gardener cannot do better than to adopt the principle of "growing his own manure." Poor soils have to be greatly improved if they are not to be worked at a loss, and this means of improving them is as cheap as any, if not cheaper. The subject is discussed at length in its own article.

Marling. — Yet another useful method of soil improvement is known as marling, or sometimes as claying. This is simpler than it sounds, and consists of putting on clay or marl in the early winter. Light soils alone benefit most from this method of improvement, including gravelly soils, which greatly appreciate the addition of clay. Obviously no good purpose would be served by marling soils already full of clay. The material is put on in November as thinly as possible (it is awkward lumpy stuff to spread) at the rate of about 1 cwt. per sq. rod if possible. The frost is allowed full play upon it, and in February or early March the weathered material is dug in, that still in rough lumps being reserved for use on a future occasion.

There are also other modes of soil improvement, such as burning the soil, sterilising it, or fumigating it, and so on. Reference should be made to our articles on *Soil Sterilisation*, *Soil Fumigating*, and *Soil Cultivation*. Methods of improvement bacteriologically and electrically are still in the experimental stage, but there is little doubt that they have a great future before them.

Before closing we give a brief summary of the best ways of improving various soils.

Clay Soils.—These need plenty of strawy stable manure, and vegetable humus of a strawy nature, as well as abundance of lime and road sand, if they are to be improved. The working of such soils should be completed as early as possible in the autumn, and the surface should be left rough for the weather to act upon. Practically all clay soils contain sufficient potash, and the application of wood ashes only tends to make the soil more plastic.

Gravelly Soils.—In these we include chalky and limestone soils, which are invariably thin and poor. The best way to improve them is to manure them heavily with animal manure of whatever sort is available, and to treat the crops growing on them liberally as regards mulches and fertilisers.

Old Black Soils.—Those which have become sour are best improved by liming heavily, and by avoiding the use of dung or acid artificial fertilisers, such as superphosphate of lime and sulphate of ammonia, for a season or so.

Sandy Soils.—To improve these, heavy dressings of sticky humus are essential. Cow or pig dung, pond mud, decayed lawn-mowings, and decomposed vegetable matter should be freely dug in. The working of such soils may be delayed until the spring.

Sour Soils.—These require heavily liming if they are to be improved as described above.—Ht. C.

SOIL STERILISATION.

This important operation does not mean rendering the soil sterile; the aim is to remove harmful vegetable and animal life from the soil so that the choicest plants may be successfully grown.

Two different series of methods may be adopted to this end, first, fumigation of the soil by chemicals (already dealt with under *Soil Fumigating*), and, secondly, physical methods employing heat or cold, which form the subject of the present notes.

Baking. — Where gardening is carried out on a large scale, soil is usually sterilised by being baked or roasted over pipes containing high-pressure steam. Amateurs cannot do this, so it is necessary to fall back on the old but efficient method of roasting over an open fire. To do this a sheet of iron is laid on bricks over a good red fire, and soil is spread thinly and loosely on it; the baking is finished when the soil is too hot to have the hand pressed on it, and a thick smoke (not steam) is a sign that the operation is going too far. Turf need not be broken up when treated in this way, but simply placed on the plate, grass side down. When the soil is being removed from the plate it should be thoroughly mixed, and allowed to stand at least a day before use.

Burning.—The same principle may be carried out when the yearly bonfire is set alight. Whatever part of the garden is to be treated should be dug up roughly, or, better still, ridged. Prunings, hedge clippings, dry grass, and as much more combustible matter as can be found, should be spread evenly and thickly over the ground, then set alight. If this is done in the late autumn, most of the pests will be near the surface, but they will be eradicated by a good fire. Why burn the rubbish round the corner, then, when such benefits accrue, and when the rich ashes are left to fertilise the soil?

Scalding.—When the soil to be treated is that required for the frame or for tomatoes, cucumbers, carnations, and other greenhouse subjects, another plan, namely, scalding, may be adopted in place of the above. The compost is placed loosely in a box, and boiling water poured through it until that running out of the bottom is appreciably warm. This plan can also be adopted after the pots are filled, though they should be allowed to drain for a day before planting.

An even better way is to fill the compost into pails or metal drums; these are then stood in a tank of boiling water, and left there until the soil becomes unpleasantly hot. This method does not wash away the soluble plant foods, and is infinitely preferable. With half a dozen drums and a good fire many bushels of potting compost can be prepared in a very few hours.

Scalding can only be done after a fashion in the open. A friend of the writer's waters his sweet pea trench and his carnation beds many times with boiling water before he actually needs them, and finds the method is quite efficient, though obviously it is somewhat tedious. Where outdoor soil cannot be baked or burnt as described above, it is preferable to use a soil fumigant.

In all heat sterilised soils initial growth is rather slow, because the process invariably kills a number of the useful soil bacteria as well as the harmful pests and disease spores; but the bacteria soon make headway, and after a brief period the growth of crops in such soils becomes astonishingly rapid.

Effects of Frost.—Extreme cold is almost as effective as extreme heat in killing soil pests, and full advantage of our winters should be taken everywhere. When the garden is dug in the autumn or winter, the surface should be left rough, or, indeed, ridged up as high as possible. (See article on *Soil Cultivation*.) The frost can then penetrate the lumps, and kill most of the pests hibernating there, and if the gardener can find time to re-ridge the soil once or twice so as to expose fresh surfaces, this method of soil sterilising will be more complete. Cold has little or no effect on diseases such as Club-root, Wart Disease, etc. Only heat is effective for destroying them.

H. H. A.

SOIL TESTING.—See *Soils: Their Origin and Nature.*

SOILS AND MANURES FOR VEGETABLES.—See *Vegetables: General Considerations.*

SOILS: Their Origin and Nature. It should be the aim of every horticulturist to understand something of the origin and nature of the soil covering his land. In order to attain this object it is necessary that he should become acquainted with some of the elementary principles of the Science of Geology, which concerns itself with the investigation of the different kinds of rock which make up the solid portion of the earth, and the various agents, biological, chemical, and mechanical, constantly at work in breaking down these rocks, wherever they are exposed at the surface, into the small particles which constitute the soil.

The geologist classifies the rocks as unstratified and stratified. The stratified rocks have all been derived originally from the unstratified in the past history of our earth, and, as the name implies, they are now found in strata, layers, or beds—an arrangement which can be seen in almost any excavation or railway cutting. The three chief types of stratified rocks are the limestones, sandstones, and shales or clays, for we find these rocks, and the soils derived from them, occupy practically the whole of these islands which is under cultivation.

Rocks give rise to soils by a process of breaking down or weathering as it is called, which may be seen and studied in any quarry or cutting where the solid rock is exposed. Suppose the quarry to be in sandstone. Below will be seen the massive rock, which, however, is not solid throughout, but is traversed by divisional planes in three directions approximately at right angles to each other. The most noticeable of these planes run more or less horizontally, and are known to the geologist as bedding planes which represent discontinuity of the deposition of sand when the rock was being formed. Oftentimes these bedding planes are marked by a change in the material making up the rock. At right angles to the bedding planes, and therefore more or less vertical, fissures and cracks known as joints are seen to traverse the rock. These bedding planes and joints split up the rock into cuboidal masses, the size of which differ in different types of rocks. The quarrymen take advantage of these natural planes of division in their operations. The natural agents, which will eventually break up the rock, also take advantage of these planes of weakness. An examination of the rock in the quarry nearer the surface will show how the roots of the plants growing on the surface have penetrated the joints and bedding planes, and by their growth have forced the masses of rocks asunder. Smaller cracks also make their appearance, often occupied by the finer roots of plants, and so the whole rock is being slowly but surely disintegrated by this means. Water falling as rain or snow will percolate through the soil to the underlying rock, and entering the cracks and joints will freeze during the winter, and by so doing exert an enormous pressure tending to widen the openings and so fracture the rock. The masses and fragments of rock so broken off are at first angular, but nearer the surface the angles become less pronounced, due largely to the chemical action of the acids contained in the water which reaches the rock through the soil. By decrease in the size of the rock fragments and increase in the admixture of decaying vegetable matter derived from the plants which have previously grown on the surface, the rock passes up through the layer known as the subsoil to the soil proper. Mention has been made of the chemical action of the water which percolates through the soil to the underlying rock, and this action will be better appreciated when it is known that water in which carbon dioxide is dissolved is a weak acid, and as such is able to attack successfully almost all the minerals making up the rocks. The most resistant mineral to such action is that known as quartz, which makes up the great bulk of a sandstone, and is familiar as the material making up the sand of the seashore. Rain in falling dissolves some of the carbon dioxide and other gases from the atmosphere, and then obtains a further supply from the decaying vegetable matter in the surface layer of the soil. This decaying vegetable matter also yields some organic acids which aid the chemical action of the water, percolating to greater depths. The roots of the growing plants also have a certain solvent action, since they give off organic acids which attack any rock they root amongst. Burrowing animals do great work by opening up channels from the surface to the subsoil, water and air thus gaining easy access.

Here then can be seen the actual making, in Nature's laboratory, of a soil, and since all soils may be said to have been originally derived from the gradual decay of rocks, it may be correctly inferred that the diversity of soils which occur in different districts is attributable to the fact that the subjacent rocks, which by their decay have yielded the material for the soils, also differ. This is true if the soils are what are known as "residual" or "sedentary" soils—terms which imply that they have been derived directly from the underlying rock. But there is another class known as "soils of transport" which, having been originally derived in the manner already noted in the quarry, have been transported by such agents as ice, water, or wind to greater or less distances from their original source. These soils may bear little or no relation to the underlying rock, unless such rock occupies very large areas, which is not the case with the rocks in England. Large tracts in England north of the valley of the Thames are covered by what is known as boulder-clay, drift, or till, which was brought into its present position and deposited by the ice-sheet which once covered that area. Or again the material known as "alluvium," which makes up the flat expanses or terraces which line our river courses, represents an accumulation of decayed rock which has been transported by the river in past times. In this country, wind is not an important agent of transport, but much of the soil covering Central Europe and Asia, known as "loëss," has been so accumulated, the wind blowing the loose particles from desiccated land surfaces and bringing them together in valleys and plains where vegetation aids in the work of accumulation. It is frequently the case that these transported soils are of great fertility on account of the intermingling of so many different types of rock material.

Having now briefly examined the mode of origin of soil, let us inquire into the nature of the materials which constitute it. The solid substances found in the soils consist either of mineral or of organic matter, the former derived from the decay of rocks, and the latter from animal and vegetable substances. When rocks decay the minerals are altered and decomposed in varying degrees, some being more resistant than others to the chemical action, as noted above, and these we find in greatest abundance in the soil. Also, the mineral ingredients of the soil vary much in size. The coarse-grained particles are called "sand," and the fine "clay." These terms are not in any way exact, but are merely used for convenience. All soils of the farm and garden will in general be found to consist of varying proportions of sand, clay, limestone, and humus. The relative proportions of the sand and clay particles determine the physical structure of the soil, and upon this to a very large extent depends its suitability or otherwise for cultivation.

Soils may be classified, according to the proportion of sand and clay which they contain, as follows :—

Sandy Loam contains 10 to 40 per cent. of clay particles.
Ordinary Loam contains 40 to 70 per cent. of clay particles.
Clay Loam contains 70 to 85 per cent. of clay particles.
Strong Clay contains 85 to 95 per cent. of clay particles.

If limestone or carbonate of lime is present in a clayey soil to the extent of 5 to 20 per cent., it is termed a *marl*. Should the percentage of limestone present exceed 20 per cent. of the total weight, it becomes a *calcareous* soil. Soils which fall under the head of loam, according to the above classification, make the most suitable soils for all general purposes.

Since sand and clay are of such importance in a study of the soils, it will be advisable to deal with these more in detail.

Sand.—This is a very indefinite term, and is applied generally to any accumulation of particles too coarse to be plastic when wet, and too fine to be called gravel. The term refers simply to the size, and not to the nature of the particles. We can prefix such words as *shell*, *quartz*, or *gem* to the word sand to make it more specific. In general, it may be said that the sand of the garden is quartz sand with some admixture of other minerals, of which the chief are felspar, mica, oxide of iron, and minute quantities of apatite, garnet, rutile, zircon, etc. The felspar and mica are usually more or less altered, and by further decomposition yield iron, lime, magnesia, potash, soda, etc., some of which may be used by plants as food. A pure quartz sand would be quite useless as a soil, but as a constituent of soils it is most valuable, as it tends to make them light and open, and therefore permeable to moisture and air. The sand particles, by absorbing the heat of the sun and communicating it to the lower layers, keep the soil warm.

Clay.—This also is an indefinite term, and is applied to any material which has the property of becoming plastic when moist. There is no sharp line of division between sand and clay. The usual acceptation is that the clay particle is a hydrated silicate of alumina (a term implying the presence of alumina, silica, and water), which is formed during the decomposition of felspar. In its purest form it becomes the kaolin, from which our finest porcelain is made, and which is found as a decomposition product round the granite mosses of Cornwall and Devon. Pure kaolin is white, but the clay in our garden soil is variously coloured brown or yellow by oxides of iron. Further, garden clays are always impure, and, like sand, contain many minerals, chief of which is mica. During its decomposition, this yields iron, magnesia, potash, etc., for plant-food. The physical properties of clay are almost exactly the reverse of those of sand; it is very retentive of moisture, and remains cool, and is therefore able to resist drought.

Soil consisting entirely of clay would be very cold and damp, and in a wet climate would be continually water-logged, excluding air and warmth. As one of the constituents of soil, however, it possesses many valuable properties, among the most important of which may be mentioned its power of absorbing and retaining the useful products resulting from the decomposition of manures, such as ammonia, lime, phosphoric acid, and potash.

Limestone, chalk, carbonate of lime, and calcium carbonate are all names for the same substance, but the last two connote the substance in a purer condition than the first two, which usually have oxide of iron, silica, magnesia, and clay present as well as calcium carbonate. In one form or another carbonate of lime is present in all soils, with the exception of peaty soils and some very open sands. From these last it has been removed, in the first case by uniting chemically with the organic acids of the decaying peat, and in the second case by solution in water containing carbon dioxide. Calcium carbonate is continually being rapidly removed from soil by the action here described, and must be as constantly renewed. One can realise the solution of limestone by visiting the huge caves which have been formed in such limestone districts as the Peak of Derbyshire, Cheddar, or round Ingleborough, simply by the process of solution of the limestone by water charged with carbon dioxide entering the fissures of the rock.

In soils derived from limestones such as occupy a large proportion of central and south-eastern England, the percentage of this material present is likely to be very high, but in general it does not exceed about 1–2 per cent., and may be even less. The quicklime which is so frequently put upon land is limestone which has been burned to drive off the carbon dioxide gas; but it will quickly absorb moisture and carbon dioxide and become again of the same chemical composition as limestone. An important reason why quicklime or burnt lime is used, is that it breaks up into an extremely fine state of division, and so becomes intimately mixed with the soil, whereas it would be very costly to powder limestone so finely. As a constituent of the soil it is useful, on account of its chemical reaction with farmyard manure, releasing the valuable ingredients and also promoting the formation of nitrates in the soil. It also acts physically upon a soil rich in clay particles, rendering the soil more friable.

Humus.—The presence of humus in the soil is shown by the dark colour which it imparts to the surface soil as compared with the subsoil. It consists chiefly of decaying vegetable matter. Since it is a product of bacterial action carried on in the absence of air, we find more humus in a clayey soil than in an open sandy soil to which air has access. The presence of limestone also prevents to some extent the formation of humus, since it combines chemically with the acids which largely compose the humus, and so prevents the further action of the bacteria. Although humus is not capable of serving directly as a plant-food, it is most valuable on account of its power of rendering the all-important nitrogen available for plant-food. The amount of humus present in cultivated soils is usually between 2 and 12 per cent. Sandy soils are the poorest and clayey soils the richest. Since humus is such a valuable constituent, the greater the amount present within the limits stated the more fertile the soil. If, however, too great a quantity be present, the soil is likely to become damp and cold on account of the power it has of absorbing and retaining moisture.

Soil Testing.—In order that improvements of soils may be carried out properly, it is necessary to know their constitution, and to accomplish this an analysis or a series of cropping experiments must be made. A complete analysis is a long and laborious work, requiring costly apparatus and practised skill, but every one may gain a working idea of the relative amounts of sand and clay particles in the following way: A small known weight of dried soil, say about 2–4 oz., should be taken and thoroughly broken up (preferably by boiling and not by hammering or pounding) in a pint of water until all the particles are separated as much as may be. After shaking and allowing to settle for a minute or so in order that all the heavier sand particles can fall to the bottom, pour off the water, which will contain the floating clay and vegetable particles, into another vessel. The point at which the water should be poured off may be found by watching the operation in a glass vessel, and noting when the small shining flakes of mica begin to reach the bottom. The clay particles will take much longer to settle than the sand particles, and so the second vessel should be allowed to stand at least one hour, and then the water very carefully poured off, taking care not to disturb the clayey material at the bottom. Dry and weigh the sand and clay separately, and from these three weighings the proportions of sand and clay can be roughly found.

It will be interesting to examine the sand and clay so separated by means of a hand lens, or better still, a microscope. The sand will be seen to be made up of particles which vary much in size, colour, and degree of rounding which they possess. The quartz grains are usually easily distinguished by their clear, vitreous appearance. The felspar shows a dull, earthy surface due to the decomposition of the mineral. Coloured grains of iron oxide are usually present; indeed, the colour of soils is more frequently due to this mineral than any other. Fragments of sandstone and other rocks as well as some of the large flat flakes of mica can generally be seen. In particular districts other minerals will be very abundant, such as glauconite in the soils derived from the greensands of the south-east of England. The material separated as clay will be seen to consist of particles and flakes of mica, and the other minerals named above, in an extremely fine state of division, as well as much material undeterminable on account of its fineness.

To find out whether the soil contains calcium carbonate or limestone, a little should be dried and rubbed down to a powder in a glass vessel. Then pour a little dilute hydrochloric acid or spirits of salts upon it, and note if there be any effervescence. If very much calcium carbonate be present, the liquid will froth up, but if only a minute quantity is present, the effervescence may hardly be noticed by the eye, but may be detected by placing the ear over the top of the vessel, the bursting of the small bubbles giving a slight hissing sound.[1] If there be a noticeable effervescence, the soil will contain sufficient lime, otherwise a dressing of quicklime for a heavy soil, and chalk for a light soil, should be applied without delay.

The humus may be estimated roughly by taking a known weight of dry soil and heating it to redness for some time on an iron plate (the homely fire shovel will do quite well), and noting the loss of weight. A soil having the following composition is best adapted for general purposes:—

Sand . . .	50–70 per cent.
Clay	20–30 per cent.
Limestone . .	5–10 per cent.
Humus . . .	5–10 per cent.

For further notes on soils, reference should be made to our articles on *Garden Geology*, *Soil Cultivation*, and *Soil Improvement*.

A. G.

SOLANUM (Nightshade.[2] Nat. Ord. Solanaceæ).—The various species of this genus include many classes, such as stove annuals, stove evergreens, shrubs, and hardy annuals. We confine our attention to the greenhouse species and the better known perennial species in the present article, naming, in closing, a few of those which are quite unsuitable, to avoid gardeners making mistakes in selecting species.

Greenhouse Species.—These are most useful subjects for the decoration of cool houses or conservatories. They are best propagated by cuttings (except *S. Wendlandii*, which is best increased by cutting well-ripened previous year's wood into lengths with one or two eyes similar to the Vine) inserted under bell-glasses or frames in sandy soil, and in gentle heat *after flowering*. A suitable soil is a mixture of equal parts good fibry loam and peat, with a good dash of sand. Temperature needed, 45–50° F., except for *S. Wendlandii*, which likes about 65–70° F.

Solanum hybridum.—This has greenish-white flowers from June to October, followed by highly ornamental red berries. Height, 1–2 ft.

S. jasminoides.—This is a good pillar or pot plant, with white, slightly tinted flowers in August. Height, 2–6 ft.

S. Melongena.—See Egg Plant in article on *Salad Plants*.

S. Wendlandii.—This is a splendid pillar or pot plant, with large clusters of lilac-blue flowers from July to August. Height, 2–15 ft.

Hardy Perennial Species.—Some of these are very useful border plants, though, of course, highly poisonous. They may be grown in the ordinary way for hardy perennial plants, and are best propagated by division of the roots in March, at which period they may be successfully planted. We recommend the following:—

Solanum etuberosum.—This bears purplish flowers from June to July, and grows 1½ ft. in height.

S. Maglia.—This is a useful white-flowered species blooming in July, and growing 1–2 ft. in height.

S. Torreyi.—This is a purple sort blooming throughout the summer, and growing about 2 ft. in height.

Undesirable Species.—In this section we include a few of the species it is advisable not to grow in the flower garden.

Solanum Dulcamara.—This is the well-known climber Bitter-sweet, bearing purple flowers from June to September, followed by red berries which are intensely poisonous. It grows up to 8 ft. in height.

---

[1] This action will not take place with freshly burnt lime, as heat has already accomplished that which the acid does in the above-mentioned experiment, namely, it has driven off the carbon dioxide from the limestone.

[2] This name, Nightshade, is often imagined to be synonymous with Deadly Nightshade. This is not the case, as the latter belongs to the genus *Atropa*, which see.—Editor.

S. nigrum.—This is a comparatively well-known annual weed which is very poisonous. It produces white flowers from June to August, followed by black berries, and grows up to 1 yd. in height. The HOUND BERRY and WONDER BERRY are forms of it (See also BLACK NIGHTSHADE in article on *WEEDS*.)

S. tuberosum.—This, the humble POTATO, although grown in flower gardens during the Great War, should be relegated to the kitchen garden. Its culture, etc., are fully described in our article on *POTATO*.

See also *CLIMBING AND TRAILING PLANTS*.

SOLDANELLA (MOON-WORT. Nat. Ord. Primulaceæ).—A small genus of hardy alpine plants suitable for the moister parts of the rock garden. They are easily propagated by division in the autumn.

What to Grow.—Only three species need be troubled about, and are briefly described below :—

Soldanella alpina. — Tufts of rounded leaves. Flowers violet coloured, fringed and drooping. Site half-shade. Soil boggy peat. Flowering Period, May to June. Height, 3 ins.

S. montana.—Larger foliage than *S. alpina*. Flowers nearly blue. Site half-shade. Soil boggy peat. Flowering Period, May to June. Height, 4 ins.

S. pusilla. — Tufts of kidney-shaped leaves. Flowers violet or white bells, deeply toothed. Site half-shade. Soil boggy peat. Flowering Period, April. Height, 3 ins.—W. I.

[The Kew authorities call the genus Soldanella the BLUE MOONWORT.—EDITOR.]

SOLDER.—See *LEAD COMPOUNDS*.

SOLID MEASUREMENT.—See under MISCELLANEOUS MEASURES in *WEIGHTS AND MEASURES*.

SOLIDAGO (GOLDEN ROD. Nat. Ord. Compositæ).—There are a great many better plants than this, but we should get into trouble with old-fashioned gardeners were we to omit it. For the wild garden, mixed border, and shrub border in sun or light shade it is useful, and it may be used for cutting.

Culture.—The Golden Rod can be grown in any ordinary soil with great ease by anyone who cares to plant it in November or February. It may also easily be raised from seed sown at the usual time in the usual way described in the article on *PERENNIALS : GENERAL CULTURE OF*, or by division of the roots in the autumn or spring. Being somewhat of a tall plant, its correct placing should be carefully attended to, and it is essential that it be securely staked early in the season, or it will fall over and become a hopeless mass of twisted stems.

What to Grow.—Any of the following may be successfully grown outside :—

Solidago canadense.—This is a favourite yellow flowering sort coming into bloom in the late summer (August), and continuing for five or six weeks. It grows about 2 yds. high and sometimes more.

S. Drummondii.—A yellow flowering sort coming in from July onwards. Height about 1 yd.

S. lanceolata.—A useful yellow autumn flowering sort opening in September, but at its best in October. Height about 2 yds.

S. serotina.—A late yellow flowering sort, at its best in October, which grows about 2 yds. high.

S. Shortii.—A very useful sort, with a lengthy flowering period commencing in August, and lasting for about three months. Height nearly 2 yds.

S. Virgaurea.—This is not as good as some of the above. It is a yellow, dwarf-growing sort about 1 yd. in height, and flowers fairly freely in August and September. The variety *cambrica* is about 1 ft. high.

SOLOMON'S SEAL (*Polygonatum.* Nat. Ord. Liliaceæ).—No garden should be considered complete without its groups of the common SOLOMON'S SEAL (*Polygonatum officinale* or *P. vulgare*). It is one of those plants which, wherever it is seen, brings back old associations of those delightful gardens where childhood was spent long ago.

For beginners the various forms of Solomon's Seal described below will prove attractive and highly accommodating subjects. They will practically grow themselves, and do well whatever treatment is bestowed upon them, and thrive luxuriantly however incorrect or haphazard this treatment may be. They do not much mind what their site is; this may be in the open sun or in the shade; nor are they particular as to soil, provided it is moderately rich and not too wet. As regards locality they seem to scorn this entirely, for they grow with quite as great profusion in town gardens as away in the heart of the country. Propagation can be effected by summer-sown seeds or spring division of the roots—the latter for preference—and planting may be successfully carried out any time between November and March.

It is a pity to stick too slavishly to the old variety of common SOLOMON'S SEAL (*P. officinale* or *P. vulgare*), for although it produces pretty drooping white flowers from June onwards, there are better species. These include *P. latifolium* and its variety *commutatum*, as well as such sorts as *P. multiflorum*, better known, perhaps, by the popular name of DAVID'S HARP, *P. polyanthemum*, *P. roseum*, and *P. sibiricum*. With the exception of *P. roseum*, which bears pink flowers in May, all are white-flowered and bloom from May to July. Their height averages 1½–4 ft. The berries of all of them are distinctly poisonous.

SOLOMON'S SEAL: FALSE.— See *FALSE SOLOMON'S SEAL.*

SOMERA.—Now included in the genus *SCILLA.*

SONCHUS (SOW-THISTLE. Nat. Ord. Compositæ).—Here is another genus for unwary amateurs to avoid. *S. oleraceus*, the most general species, the COMMON SOW-THISTLE or HARE'S LETTUCE, is a troublesome weed in many districts. A means of control will be found for it with a short description under the former name in our article on *WEEDS.*

SOOT.—See *SOIL FUMIGATING.*

SOOTY BLOTCH, SOOTY MOULDS.— See *DISEASES OF PLANTS.*

SOPHORA.—For the best species see *SHRUBS* and *TREES.*

SOPHROCATTLEYA, SOPHROLÆLIA, SOPHROLÆLIOCATTLEYA, and SOPHRONITIS. — See *ORCHIDS.*

SORCERESS.—See HARMFUL FUNGI in *FUNGI: EDIBLE AND HARMFUL.*

SORGHUM (MILLET GRASS. Nat. Ord. Gramineæ).—This is a genus of half-hardy grasses hardly worthy of the greenhouse culture required in this country. *S. vulgare*, known respectively by the names of DARI, DURRA, and GUINEA CORN, is the best species, and grows about 4 ft. in height. The genus is distinct from *MILIUM* (which see), also known as MILLET GRASS.

SORREL (*Rumex Acetosa* and *R. scutatus*. Nat. Ord. Polygonaceæ).—The broad leaves of the cultivated form of this plant make a decided acquisition to mixed salad, and are much appreciated by our French friends but too little known at home. Possibly with the wider appreciation of vegetables will come a fuller recognition of the value of salads; then we may expect to see a small patch devoted to this plant in every kitchen garden of importance.

Culture.—Although Sorrel may be found growing very luxuriantly in a wild state upon soils of almost all descriptions, it will well repay those who set out to get the best results from a patch in the home garden to give this something beyond ordinary cultivation. A well dug and heavily manured soil favours the production of large fleshy leaves, scarcely recognisable by those who grow the plant without care in any out-of-the-way corner.

The seed, which may be obtained from any of our best known seedsmen, may be sown any time from the end of March until June. The distance between the drills should not be less than 12 ins. These drills need not be very deep, just sufficient to cover the tiny seed being ample. Thin sowing should be practised in order that the plants may have as little disturbance at the root as possible.

About 10–12 ins. should be allowed between the plants, although half this distance will suffice during the early stages of growth; the surplus, if pulled young, provide very acceptable salad material, or are useful for flavouring purposes.

In early spring give the bed a good mulch of manure or frequent soakings with liquid manure, such treatment being followed by leaves of extra large size. To maintain a good supply of these large leaves, new beds should be formed every two years.—F. R. C.

SOUR SOILS: IMPROVING.—See *SOIL IMPROVEMENT*.

SOUTHERNWOOD.—The genus ARTEMISIA and *A. Abrotanum*. See *ARTEMISIA*, *MEDICINAL HERBS*, and *SHRUBS*.

SOWBREAD.—A name applied to the genus *CYCLAMEN*, which see.

SOWBUGS.—See under WOODLICE in *INSECT PESTS*.

SOWING.—See *SEED SOWING* and *TREES: RAISING FROM SEED*.

SOWING SWEET PEAS.—See *SWEET PEAS*.

SOWTHISTLE, or SOW-THISTLE.—See *SONCHUS*. See also under COMMON SOWTHISTLE in *WEEDS*.

SPADES.—See *GARDEN TOOLS*.

SPANISH BROOM.—The genus SPARTIUM. See *SHRUBS*.

SPANISH CHESTNUT.—The genus CASTANEA, which see in *TREES*. See also *Castanea sativa* in *NUT CULTURE*.

SPANISH FIR (*Abies Pinsapo*).—See *TREES*.

SPANISH GORSE (*Genista hispanica*). See *SHRUBS*.

SPANISH KALE (*Crambe hispanica*). See *CRAMBE*.

SPANISH NUT.—See under COBNUT, FILBERT, AND HAZEL in *NUT CULTURE*.

SPANISH OAK (*Quercus cuneata*).—See *TREES*.

SPANISH SAVIN (*Juniperus Sabina tamariscifolia*).—See *TREES*.

SPANISH SQUILL (*Scilla hispanica*).—See *SCILLA*.

SPARAXIS (Nat. Ord. Iridaceæ). This is a very bright and gay-flowered genus from South Africa. Unfortunately it is only half-hardy in most places in the British Isles, hence the different varieties should be grown in pots. Only in very favoured places may it be grown out of doors, and then it needs protection in the winter. The flowers most frequently seen are those of various-coloured hybrids raised from *Sparaxis grandiflora*, *S. tricolor*, and *S. versicolor*. They bloom in April, May, and October.

Culture.—Bulbs should be potted in September or October, and then placed in a darkened cold frame, being given light when growth begins. The plants must be protected from frost. Five or six bulbs look well in a 5-inch pot. Very little water must be given until the pots are full of roots and top growth is commencing. *Sparaxis pulcherrima* (Syn. *Dierama pulcherrima*) is totally different from all the other varieties and species. It is not very hardy except in dry, warm positions in the south and south-west of England, although in one case it has been proved to be hardy as far north as Kirkcudbrightshire. The number of beautiful hybrids now offered in dealers' lists is considerable. These flower in August and September.

Species and Varieties :—*Sparaxis Fire King*.—This bears fiery scarlet flowers, with yellow centre, in May. Height, 1 ft.

S. grandiflora.—This bears purple flowers in late April, but there is a white and a parti-coloured variety as well. Height, 1–2 ft.

S. pulcherrima (Syn. *Dierama pulcherrima*[1]).—A very tall slender-looking variety with wiry stems from which hang small pendulous rosy-purple flowers. Although proved to be hardy as far north as Kirkcudbrightshire it does best in a warm situation out of doors, and is useful for cutting. It blooms in October and grows 4–6 ft. in height.

S. Scarlet Gem.—This is one of the best of the hybrid forms, with beautiful brilliant scarlet flowers opening in May. Height, 6–9 ins.

S. tricolor.—The flowers of this are usually orange, or some shade of yellow, and open in May. Height, 12–18 ins.

There are generally a good many varieties listed in the autumn bulb catalogues. These should be consulted as the nomenclature seems to be uncertain.—J. J. & E. T. E.

NEW VARIETY.

Sparaxis King George V.—This bears large crimson-maroon flowers, which are yellow at the base. It is of vigorous habit, and is suitable for warm borders, rock garden, or pot culture.

SPARMANNIA (AFRICAN HEMP. Nat. Ord. Tiliaceæ).—This is a very free-flowering greenhouse evergreen shrub, which is propagated by cuttings of young half-ripened shoots in April, inserted in a frame or hand-light with slight bottom heat. A good turfy loam, peat, and sand is a suitable compost. Temperature required, 40–50° F.

Greenhouse Species.—*Sparmannia africana*.—White. Flowers in May. Height, 1½–2½ ft.

S. a. flore pleno.—Double white. Flowers in May. Height, 1½–2½ ft.

SPARTINA (PRAIRIE GRASS. Nat. Ord. Gramineæ).—This is a genus of hardy perennial grasses of little value for the garden, though at times grown in the wild garden. *S. polystachya* (Syns. *S. cynosuroides* and *S. Schreberi*) is the REED GRASS, while *S. stricta* is the CORD GRASS. Both thrive in any soil, the first attaining a height of nearly 2 yds., while the second only reaches half that height.

SPARTIUM.—For the best species see *SHRUBS*.

SPATHOGLOTTIS.—See *ORCHIDS*.

---

[1] We retain the old name here as it is far better known than the new one. —EDITOR.

SPATHULARIA.—Now included in the genus *SAXIFRAGA*.

SPATLUM.—See *LEWISIA*.

SPEAR GRASS.—See *ACIPHYLLA*.

SPEARMINT, or SPEAR MINT.—See *MENTHA* and *POTHERBS*.

SPEARWORT (*Ranunculus Lingua*).—See note at end of article on *RANUNCULUS*.

SPECIAL MANURES.—See *MANURES*.

SPECIES AND HYBRIDS OF CROCUSES.— See under SPECIES AND VARIETIES in *CROCUS*.

SPECKLED ALDER (*Alnus incana*).—See *TREES*.

SPECULARIA.—See *VENUS'S LOOKING-GLASS*.

SPEEDWELL.—See *VERONICA*. See also the genus VERONICA in *SHRUBS*.

SPENT HOPS.

These are often available in large quantities from breweries, and may be made use of as manure for the garden. In their fresh state they are not of much manurial value, but if stacked in a heap for about six months and frequently soaked with urine or liquid manure, they will prove when dug in to be of immense value, especially on light soils. They should be used at the rate of about 4 cwt. per sq. rod.

SPERGELLA.—Now included in the genus *SAGINA*.

SPHAEROSPORA.—Now included in the genus *GLADIOLUS*.

SPHAGNUM MOSS.—This is referred to in our articles on *MOSS* and *ORCHIDS: POTTING AND WATERING OF*.

SPIDERWORT.—A name applied to *TRADESCANTIA*, which see.

SPIGNEL.—See *MEUM*.

SPIKE RUSH.—See *ELEOCHARIS*.

SPIKED CORYLOPSIS (*Corylopsis spicata*).—See *CLIMBING AND TRAILING PLANTS*.

SPIKED RAMPION (*Phyteuma spicatum*).—See *HORNED RAMPION*.

SPIKENARD (*Nardostachys Jatamansi*. Nat. Ord. Valerianaceæ).—This may be grown in the rock garden or rock border in light soil without much difficulty. It bears pink flowers from July to August, and grows 18–24 ins. high. It must be carefully distinguished from PLOUGHMAN'S SPIKENARD (*Inula Conyza*), a wild plant or weed of no garden value.

SPIKENARD: FALSE (*Smilacina racemosa*).—See *FALSE SOLOMON'S SEAL*.

SPIKENARD: PLOUGHMAN'S (*Inula Conyza*).—A wild plant of no garden value.

SPILONOTA.—See under ROSE GRUBS in *INSECT PESTS*.

SPINACH (*Spinacia oleracea*. Nat. Ord. Chenopodiaceæ). — Among profitable crops requiring only a short time to attain useful size, Spinach is entitled to a foremost place.

Culture.—A good deep loam enriched with a liberal amount of manure ensures a continuous supply of fresh leaves over quite a long period; but where the bed of soil is shallow, or of a light sandy nature, the sowings made for summer gathering often suffer considerably from drought, and for this reason, where such soil exists and spinach is highly valued, sowing on the little and often principle is recommended in preference to the two or three larger sowings usually found to be sufficient where the plants enjoy a deep and rich soil.

Two varieties are in general cultivation, one having round, the other prickly seed, the produce from either sowing showing little if any difference when cooked.

The Prickly variety is claimed to be the most hardy, and for this reason is usually recommended for autumn sowing; but in light soils we have found the Round to be equally dependable for winter and summer use.

A small sowing may be made in a warm border early in March, selecting a spot where the crop will be sheltered from cold winds, these retarding growth equally as much as frost. Sow in drills about 12–15 ins. apart, and not less than 2 ins. deep. On good soil each plant should have a clear space of 1 ft. in the row, but where the soil is poor and little manure added 8 ins. will be ample.

The earliest sowings often run to seed quite early in the season, particularly if a dry period follows germination. This risk will be considerably minimised if the hoe is used frequently between the rows.

Picking may commence as soon as the leaves are the size of a crown-piece, care being taken to do it without disturbing the roots, always confining attention to one row at a time. If this is done there will be no waste of leaves, but a constant supply always coming on.—F. R. C.

SPINACH BEET.—See *PERPETUAL SPINACH.*

SPINACH: NEW ZEALAND (*Tetragonia expansa.* Nat. Ord. Aizoaceæ).—This is quite distinct from the two other varieties. It requires to be sown one seed in a small pot in a greenhouse during April, and kept well supplied with water until the end of May, when a good sunny position should be chosen, and the plants put out at not less than 30 ins. between the rows and 2 ft. between the plants. If well supplied with water, plants at this distance will cover all the ground between them in a very short time, and continue to give crops of large fleshy leaves until destroyed by frost. Readers having a hot dry soil where the ordinary spinach rarely gives satisfaction, may safely plant this and have no fear regarding the result.—F. R. C.

[This vegetable does not prove digestible to some people.—EDITOR.]

SPINACH: PERPETUAL. — See *PERPETUAL SPINACH.*

SPINACIA.—See *SPINACH.*

SPINDLE-TREE. — The genus EUONYMUS and *E. europaeus.* See *CLIMBING AND TRAILING PLANTS* and *SHRUBS.*

SPIRAEA (Nat. Ord. Rosaceæ).

This genus is a large one, but it is beyond our scope to describe anything like all the species which are known. Many species are shrubby, and some of these are included in our list of Shrubs (see article on *SHRUBS*). Those we describe below are hardy tuberous perennials or hardy herbaceous perennials, suitable for herbaceous or mixed borders. All are closely allied to the genus *ASTILBE* (which see), and when any re-classification is done the two genera will probably be united.

Culture of these plants is a simple matter. They are fond of cool damp spots in light but rich soil, and are excellent subjects for shady borders or under light shade of trees. If grown in full sun plenty of water must be afforded them throughout the summer. A mulch of very old manure or leaf-mould in the early winter is greatly to their liking, and free cutting of the flowers will increase the length of the blooming period. As regards propagation this is quite a simple matter, and is best effected by division of the roots in February or March, which months are also the best periods for planting. We recommend the following:—

Spiraea Aruncus (GOAT'S BEARD).—This is one of the well-known sorts bearing white flowers in June and July, and growing 3–4 ft. high.

S. astilboides.—This is a white July blooming sort about 1½ ft. high.

S. decumbens (Syn. *S. procumbens*).—This is a good species for the rock garden, bearing white flowers from June to August, and growing about 12 ins. high.

S. digitata.—This bears attractive red flowers in July, and may grow up to 1 yd. in height.

S. Filipendula (DROPWORT).—This white tuberous-rooted perennial bears its bloom in September, and grows about 2 ft. high.

S. japonica.—Syn. *Astilbe japonica*, which see.

S. lobata.—This bears red flowers from July onwards, and grows about 1½–2 ft. in height.

S. palmata.—This is a synonym of *S. digitata* according to some authorities, but is recognised as a distinct species at Kew. It bears dark red flowers from July to August, on plants about 1½ ft. high. Its variety *alba* is white.

S. procumbens.—Syn. *S. decumbens* above.

S. Ulmaria.—This, the common MEADOW SWEET, is not worthy of border culture, but is highly useful in the wild garden, where its white flowers are produced freely in July and August, on plants 2–3 ft. high.

SPIRE REED (*Phragmites communis*). See *PHRAGMITES*.

SPIRITS OF SALTS.—A popular name of HYDROCHLORIC ACID, which see in *ACIDS: THEIR USES IN HORTICULTURE.*

SPOTTED ORCHIS (*Orchis maculata*). See *HARDY ORCHIDS*.

SPRAY YOUR POTATOES. — The reasons for urging this will be found in the article on *POTATO BLIGHT*.

SPRAYING FRUIT TREES. — See *FRUIT TREES: SPRAYING.*

SPRAYING MIXTURES AND FUNGICIDES.—Of chemical substances which are poisonous to fungi and act as "fungicides," the two most important are copper and sulphur, and most of the fungicides in common use depend for their killing action upon one or the other.

Fungicides are used as liquid spraying mixtures, dry powders, steeping solutions, and washes. In a general way spraying mixtures have proved more efficacious for the majority of diseases in England, though powders are preferable in a few cases. Steeps are used for disinfecting bulbs, potato tubers, seeds, etc., and the same solutions, made a little stronger, may be employed for sterilising bags, boxes, floors, walls, etc. Of patent mixtures some are good and some bad, but it is obvious that in the present work none can be singled out for praise or censure. The chemical mixtures and solutions recommended below have proved their value as thoroughly good fungicides. With regard to Burgundy Mixture, if pure chemicals are used, such an excellent mixture can be prepared with comparatively little trouble, that the fresh home-made article is to be recommended. Bordeaux Mixture is slightly more difficult to make; but here again the home-made article gives first rate results, which cannot always be said of ready-made proprietary preparations.

Bordeaux Mixture.—For Bordeaux Mixture lime is used instead of the usual soda, and it will be convenient to take the same sized vessels for mixing as for Burgundy Mixture below. Freshly burnt quicklime of the best possible quality in lump form should be obtained, and the copper sulphate should be of fully 98 per cent. purity. The amounts required for potato spraying are 4 lb. copper sulphate and 2 lb. lime (for fruit, see next paragraph). The copper sulphate should be dissolved in 5 gallons of water in the large tub, and 30 gallons of water added. In the smaller vessel 2 lb. of lime should be slowly slaked with a little water, gradually adding water until the whole becomes a thick cream, which should then be diluted with water to make 5 gallons. This must be thoroughly stirred, and strained through a fine wire sieve if necessary. When required for use the two solutions should be mixed by slowly adding the lime-water to the 35 gallons of copper sulphate, the whole mixture being vigorously stirred during the process. If the mixture has been rightly prepared it should have a flocculent precipitate that remains in suspension, and the whole 40 gallons should be uniform, no clear fluid separating out. It must be used as soon as possible, and will not keep good more than twelve hours.

FOR FRUIT-TREE SPRAYING.—The preceding mixture is primarily for potato spraying. For fruit trees slightly different proportions are now generally used. Copper sulphate 4 lb., best burnt lime 4 lb., and water 50 gallons. It is used for Apple Scab, Pear Scab, and Vine Mildew, and further details will be found under these headings in our articles on *APPLE DISEASES* and *DISEASES OF PLANTS*. Burgundy Mixture is not considered suitable for fruit trees.

Burgundy Mixture.—This is used almost exclusively for potato spraying. For mixing Burgundy Mixture a 40-gallon paraffin barrel is a convenient size, and another smaller vessel, holding at least 5 gallons, will be required. On no account must an iron or zinc vessel be used for holding the copper sulphate used in this or in Bordeaux Mixture. Forty gallons will spray about 50 rods. The mixture now recommended is that known as 1 per cent., for which purpose 4 lb. of pure copper sulphate (which should again be obtained with a guarantee of 98 per cent. purity) and 5 lb. of pure washing soda will be required. If a smaller quantity of mixture be desired, it is easy to make a calculation based on the above figures. The solution should be prepared early in the day, as it deteriorates rapidly and must be used at once, and certainly not more than twelve hours after mixing. The method of mixing is as follows:—

First dissolve the 4 lb. of copper sulphate in 5 gallons of water in the large tub; if the copper sulphate is in crystal form it should be crushed first. When dissolved, add 30 gallons more water and stir. Next dissolve the 5 lb. of washing soda in 5 gallons of water in the smaller vessel; the more finely broken up the soda is the quicker it will dissolve. When it is completely dissolved the two solutions may be mixed. The soda solution should be slowly poured into the 35 gallons of copper sulphate, stirring the whole thoroughly meanwhile. The resulting mixture should be a brilliant blue, and with a fine precipitate which should remain in suspension for some time. As the sulphate of copper is poisonous, some care should be exercised, and the tubs should be well rinsed out after use.

A good knapsack sprayer may be used for spraying in quite small gardens; for greater areas there are many larger and efficient machines. The important point is to cover the foliage with the mixture both on the upper and the under surfaces. A fine mist is the ideal state in which the spray should be applied; if too much is given the mixture rolls off and the leaf surface is not properly covered. See also article on *POTATO BLIGHT*.

Lime Sulphur.—This is an excellent spray for mildews (notably American Gooseberry Mildew), and is also useful for Apple Scab and other diseases. It has the advantage of being easily prepared, since very good brands of concentrated lime sulphur can now be purchased in large or small drums, and all that is necessary is to add the appropriate amount of water. A guarantee of 1·3 specific gravity should, however, be obtained when ordering. As sulphur reacts with copper, care must be taken that machines with copper parts are not used for lime sulphur spraying. For ordinary summer use the strength required is 1 part in 30 (*i.e.* 1 gallon of the concentrated solution to 29 gallons of water, or 3 pints to 10 gallons). The concentrated lime sulphur should be poured slowly into the water, well stirred, and used the same day. In the case of a few varieties of apples, notably *Cox's Orange Pippin*, and gooseberries (see under GOOSEBERRY MILDEW (AMERICAN) in article on *DISEASES OF PLANTS*), scorching occurs at the above strength; hence the half summer-strength solution should be used (*i.e.* ½ gallon of concentrated lime sulphur to 29 gallons of water, or 1½ pints to 10 gallons).

Potassium Sulphide (or *Liver of Sulphur*). — This substance was formerly used extensively either as a simple solution or with the addition of other substances. Owing to war conditions it has, however, become scarce, and growers have resorted more to lime sulphur. Potassium sulphide is specially useful for indoor work or in the case of ornamental plants, where a white covering of Bordeaux Mixture would be objectionable, and it is advised also in the case of indoor fruit. The usual strength recommended is 3–5 oz. of potassium sulphide to 10 gallons of water, the exact proportions depending on the nature of the plant and on the hardness of the foliage. As a rule, however, the simple solution of potassium sulphide in water does not posesss sufficient wetting power, and for this reason the addition of a small quantity of soft soap (1½–2 lb. to the 10 gallons, depending on the hardness of the water) is advisable. Such a mixture is undoubtedly effective for many mildews, but in the case of American Gooseberry Mildew, the summer stage of which is particularly "powdery," the further addition of paraffin (1½ pints to the 10 gallons of spraying solution) has proved necessary to destroy it effectively. It is necessary, however, to be very cautious when using paraffin sprays.

Powders for Dusting.—Dry powders are successful in combating certain diseases, especially mildews. Flour of sulphur, or better still some of the very finely precipitated forms of sulphur, including green and black, are the most useful. These powders should be applied by means of a sulphurator or special bellows, or any home-made apparatus that will distribute the powder in a fine and even manner. Powders are particularly useful for Onion Mildew, Peach Mildew, Rose Mildew, Strawberry Mildew, and Tomato "Rust," and should be applied early in the morning, when the plants are wet with dew. They are more effective in warm dry weather than when wet and dull.

Soil Fungicides.—Though several substances, such as bleaching powder, carbolic acid, and copper sulphate, are powerful fungicides, a good method of thoroughly disinfecting the soil with chemicals is badly needed. One of the greatest difficulties is, that it is practically impossible to distribute the substance thoroughly and evenly through any bulk of soil without giving some part too much, and thus poisoning it as a whole. So far the most satisfactory method is sterilisation by steam, for which purpose several forms of apparatus are now on the market; but this is obviously only suitable for work on a small scale or glasshouse use. In a general way fungous diseases at the root are more prevalent in soils lacking lime; liming therefore, though by no means sufficient to kill fungus spores, should not be neglected.

Steeps.—Steeping solutions used for sterilising seed tubers, etc., are generally prepared from copper sulphate or formaline. The former, though extensively used by the farmer, is not often required by the horticulturist, but a 2 per cent. wash of copper sulphate is useful for disinfecting bags, boxes, floors, etc., suspected of being infected with fungus spores. Formaline, however, is more effective, though more dangerous to handle. The greatest care must be exercised and only weak solutions employed. For steeping seed potatoes contaminated with spores of ordinary scab or corky scab, ½ pint of formaline in 15 gallons of water is sufficient strength, and the tubers should be steeped for three hours in the solution. The same strength is useful for disinfecting floors, etc.—A. D. C.

SPREADING CLEMATIS (*Clematis patens*).—See *CLIMBING AND TRAILING PLANTS.*

SPRING BLOOMING ROCK PLANTS. See ROCK PLANTS FOR SPRING BLOOMING in *ROCK PLANTS FOR ALL PURPOSES.*

SPRING CABBAGES.—See *CABBAGE.*

SPRING-FLOWERING BULBS (for Rock Garden).—See *ROCK GARDEN BULBS.*

SPRING-FLOWERING CROCUS.—See SPECIES AND HYBRIDS under SPECIES AND VARIETIES in *CROCUS.*

SPRING GARDEN, THE.

The spring in the garden is really the time of re-birth of plant life, and although botanists may prove to us that the re-start is made in the autumn, the fact is not sufficiently evident to convince gardeners of its truth. Certainly the spring is one of the most beautiful times in the garden, though not so beautiful as summer; but the freshness of everything, the new zest for life of every tree and plant, and the colour of the first flowers make spring alike a beautiful and happy time. As the gardener goes round his borders in the early spring he sees everything shooting into new growth, with the increasing sunshine and the lengthening days. Soft succulent shoots push their way through the bare soil, and what was a day or two before nothing but black earth, is now covered with lovely green verdure. The same remark applies to his deciduous climbers. One day there will be nothing but bare stalks, and the next day they are covered with a wealth of green leaves. The spring is also the time for splashes of colour. Borders judiciously planted with bulbs in the autumn may be one day green, and the next day golden; and one day they may be grey, while on the next they are covered with crimson flowers. In the rock garden, too, the evergreen plants may, when one looks at them, be a silvery-green, on which the winter rain and frost have played, and a little later be covered with all the colours of the rainbow.

Certainly the spring is one of the gardener's happiest periods. He cannot help being stimulated to new exertions, and new experiments, as he watches his flowers shooting up as he works amongst them. There is something invigorating also about the beautiful scents of the spring flowers, the soft winds and sunny days, and even the April showers.

Work in Spring.—We must not, however, take up all our space with describing the wonders of spring, for this Dictionary is to be a practical work first of all, so we pass on to mention a few of the many jobs that must be done at this season, and the first job we must carry out before any others, is to hoe thoroughly, and loosen the soil among our quick-growing herbaceous plants. Weeds, of course, spring up quite as quickly as other plants, and unless our borders are to be glorious with the colour of Dandelions, matted with the growth of Crowfoot weed, and carpeted with a covering of Daisies, it will be necessary for us to bring our hoe out and to work it very hard. A good thing to do is to follow the hoeing with a thorough raking, and then we can remove from the borders surplus stones which have worked up during the last winter. Another job of great importance is the planting of bare spaces in our borders to make good the fatalities of the previous winter. Jack Frost will take his due, and he deserves it for the good he does, but when he robs us of the choicest specimen of *Anchusa italica*, our very best Helenium, and the *Polemonium Richardsonii* of which we were so proud, we perhaps feel unkindly disposed towards this useful and benevolent gentleman. So when the spring comes, and before it is many days old, our borders should be carefully gone over, the bare spaces being marked, and suitable subjects planted to fill the gaps which have been made. It would take up too much space to describe the many subjects which can be used, but readers should study the articles on the various plants which will be found in this Dictionary.

Yet another job in the spring is the sowing of Hardy Annuals. There has been somewhat of a prejudice against the free use of Hardy Annuals, but such prejudice is mistaken, as the Hardy Annuals include some of the most lovely of all the plants the gardener grows. The pure simplicity of the Shirley Poppy, with its lovely colours, the glorious spikes of Godetia and Clarkia, the dazzling orange of the Pot Marigold (*Calendula officinalis*), are but a few instances of the beauty of these plants. Early sowing invariably gives good results, and the end of March and the beginning of April are periods which should not be wasted for getting the seeds into the ground. April showers are inseparable from the culture of Hardy Annuals, and if sowing is postponed until early May as so many advise, the plants miss these natural benefits and so suffer greatly in consequence.

There is no doubt that spring is also the time for replenishing the rock garden, and here we must admit that we are unorthodox. Many rock gardeners advise the sowing of all manner of Hardy Annuals in the rock garden during April, but why the rock garden should be taken up with them when most of them do better in the open borders, is a question which fortunately it is not our task to answer. It seems to us wasted space and wasted effort to sow Hardy Annuals in the rock garden, but there is no reason at all why rock plants of the usual kinds should not be planted, provided that the work is done early in April, and they are looked well after as regards water. Almost all of the Saxifrages, Sedums, and Sempervivums may be successfully planted during this month, and a wealth of other subjects too numerous to mention.

Provided that the work is done in the early spring, there is no reason at all why wall gardens should not be planted, and of these we cannot speak too highly from the point of view of their beauty. We see no reason why there should be bare, ugly walls, supporting earth in gardens, when there is such a number of plants which will cover these walls. It seems to us whenever we pass such walls that glorious opportunities for colour effects have been wasted, and all garden lovers should be on the look out for new chances of increasing the beauty of their gardens.

Indoor Gardening. — Spring is certainly a busy time in the indoor garden, what with potting of plants, raising suitable subjects for bedding, and so on. There is also the re-potting of many subjects to be done, and this operation cannot well be carried out except at a time when the plants are just re-starting into growth. Much care is needed in looking after newly re-potted subjects, since over-watering may soon spell disaster. For this point we will refer the reader to our articles on *GREENHOUSE: MANAGEMENT OF*, and *WATERING*.

The gardener should also in the early spring buy in such quantities of fertilisers as he may be likely to require. He should likewise look through his appliances, such as his Potato Spraying Machine, his Mowing Machine, and seal up all the holes in the bottom of his watering-cans. These appliances will all be needed in the early summer, if not before, and to have them ready will save much time later.—E. T. E.

SPRING MEADOW SAFFRON (*Bulbocodium vernum*). — See *BULBOCODIUM*.

SPRING NOTES.—See *ALLOTMENTS: MANAGEMENT OF*.

SPRING SNOWFLAKE (*Leucojum vernum*).—See *SNOWFLAKE*.

SPRING AND SUMMER SPRAYING.—See *FRUIT TREES, SPRAYING*.

SPRING or WINTER BEDDING PLANTS.—See *BEDDING PLANTS: SELECTED LISTS OF*.

SPRINGTAILS.—See under MUSHROOM PESTS in *INSECT PESTS*.

SPRINKLERS.—See *GARDEN APPLIANCES*.

SPROUGHTON HOE.—See under HOES in *GARDEN TOOLS*.

SPROUTING BROCCOLI.—See *BROCCOLI*.

SPRUCE.—See PICEA in *TREES*.

SPURGE.—A name applied to the genus *EUPHORBIA*, which see. See also under PETTY SPURGE and SUN SPURGE in *WEEDS*.

SPURGE: CAPER (*Euphorbia Lathyrus*) and **SPURGE: CORN** (*Euphorbia segetalis*).—See *EUPHORBIA*.

SPURGE: LAUREL (*Daphne Laureola*). See *SHRUBS*.

SPURGE: PETTY. — See *Euphorbia Peplus* in *EUPHORBIA*, and PETTY SPURGE in *WEEDS*.

SPURGE: SUN.—See *Euphorbia helioscopia* in *EUPHORBIA*, and SUN SPURGE in *WEEDS*.

SPURGE: WOOD. — See *Euphorbia amygdaloides* in *EUPHORBIA*.

SPURGE, or WOOD LAUREL (*Daphne Laureola*).—See *SHRUBS*.

SQUARROSE PINK (*Dianthus squarrosus*).—See *DIANTHUS*.

SQUASH.

This resembles the Pumpkin, and may be grown in the same way as the *VEGETABLE MARROW*, which see.

SQUILL.—See *SCILLA*.

SQUIRREL-TAIL GRASS (*Hordeum maritimum*). — See *HORDEUM* and *ORNAMENTAL GRASSES*.

SQUIRTING CUCUMBER.—A decorative Gourd. See *ORNAMENTAL GOURDS*.

STABLE MANURE. — See under STRAWY MANURE in *HORSE MANURE*.

STACHYS (WOUNDWORT. Nat. Ord. Labiatæ).—This genus contains a large number of annual and biennial, hardy and half-hardy evergreen species, all of which are of little interest and are excluded from the present edition of this work. A few of the best of the hardy perennial species for the herbaceous border are described below; these thrive in ordinary common garden soil, are propagated by seeds sown in the spring or summer, or by division of the roots in the autumn and spring, and may be successfully planted from October to March :—

Stachys affinis (Syn. *S. Sieboldi*).—See article on *CHINESE ARTICHOKE.*

S. alpina.—This may be planted in the rock garden and bears purplish-red flowers from June onwards. It only grows 1 ft. high.

S. Betonica.—This is the common WOOD BETONY, bearing purple flowers from June to September, and growing about 2 ft. high. It is referred to in our article on *MEDICINAL HERBS.*

S. coccinea.—This is an attractive scarlet July blooming sort needing a warm corner. It grows about 1 yd. high.

S. grandiflora.—This is a large purple-flowered sort blooming in May and June, and growing 1½ ft. high.

S. recta.—This bears yellow flowers in July, and grows about 2 ft. high.

S. Sieboldi (Syns. *S. affinis* and *S. tuberifera*).—See article on *CHINESE ARTICHOKE.*

S. tuberifera.—Syn. *S. Sieboldi* above.

STACHYS.—This is a synonym for *CHINESE ARTICHOKE*, which see.

STACHYURUS.—For the best species see *SHRUBS.*

STAFF TREE (*Celastrus articulatus*). See *CLIMBING AND TRAILING PLANTS.*

STAGGER-BUSH (*Pieris mariana*).—See *SHRUBS.*

STAGHORN SUMACH (*Rhus typhina*). See *TREES.*

STAKES AND STAKING.

It is probable that no one who sets out to tend a garden gives a thought to the part stakes and staking will play in its future successful conduct. The primary thought of all gardening enthusiasts is the soil; but soon there comes a time when, plants having made their appearance, it is seen some support must be given if they are to develop to their best and withstand the weather. The subject of staking is most naturally associated with flowering plants, and it is with this end in view these notes are given, though, incidentally, staking is also necessary in both the fruit and vegetable garden.

Staking : Its Use.—The secret of proper staking is to preserve the natural symmetry of the plants. This is an art requiring considerable practice. Much staking done has the very opposite effect to that of preserving the natural beauty of the plant. Generally it is much too tightly done, giving the subject a "bunched" appearance. Such work is very ugly—the inborn natural grace of the plant being completely destroyed.

Some families of plants can be dwarfed by being pinched in early growth, thus almost obviating the need for staking, and in any case rendering a shorter form of support quite efficient. Examples answering to this treatment are border Chrysanthemums and Michaelmas Asters. Many other hardy flowers can be pinched, and will suggest themselves to the observant enthusiast.

It is better to stake thoroughly than to do the work by halves. Flimsy staking is all too frequent. Plants might just as well be left to fall about on the ground from the first as to loll about between two wobbly stakes, or tied round the waist to one stake, giving an appearance greatly resembling a child's gollywog.

When and How to Stake.—Some say staking should not be done until really necessary. This sounds feasible—it would be eminently practical, if we could forecast the weather; but a sudden gale may come on, and plants hitherto in the finest condition may be laid flat in all directions through neglecting to stake them. It is better to secure all plants that are expected to want support in an early stage of growth. Such will prevent disaster and save many disappointments. Not all types of plants will need dealing with at one time. Some will need attention sooner than others. Those which suffer most if long delayed are annuals, climbing plants, and such choice genera as Delphiniums and Lilies.

The reasons for this will be obvious: Annuals become straggly in appearance when left unstaked too long, and never wholly regain that first healthy erectness of form; climbers, when staking or training is neglected, become an intertwined mass, and are so easily snapped or broken at the base that no further emphasis should be wanted to show the folly of delaying early support. On the other hand, fortunately, many hardy flowers—perhaps the greater bulk—do not suffer so disastrously if for any reason it is not possible to stake them when one would desire to.

How to Stake.—Closely bound up with when to stake a plant is how it should be done. Briefly, this should be so done that when plants reach perfection the stakes appear an essential part of the plants, and look as unobtrusive as artificial assistance can do. Also, stakes should be so placed in position that their tops lean slightly outwards; this allows more space for the increased growth of stem and foliage natural to all plants nearing full growth. The distance, too, of the stake from the root or crown of a plant should not be lost sight of, the chief point being to avoid driving the support into roots or crowns, especially those of delicate constitution and precious worth.

Kinds of Stakes to Use.—Roughly, stakes can be divided into two groups: branched, and trimmed or straight stakes. (Reference to the wire spiral supports used by some Carnation growers is here purposely omitted.) Both kinds have their value and place of use, but the trimmed stakes are often made to do duty when the untrimmed or spruce stakes ought to have been used. Indeed, one might add, the latter type of stake is practically unknown in very many so-called good class gardens of to-day. Such gardens are the losers; for it is the use of branched stakes only which permit in many plants their free and normal appearance. To be convinced of the enormously increased beauty where branched stakes are used, readers will only need to sow two different beds of each of such annuals as Clarkia and Nigella. One bed of each should be staked with ordinary straight sticks, and the other bed of each with branched or twiggy sticks. Within a few weeks the superior results of the latter will be easily seen.

Among straight stakes high place must be accorded to canes of all sizes; they are handy and durable. Deal stakes too of all sizes are serviceable and much in demand. They should be painted to preserve the wood, a dark green colour being the least obtrusive. But any kind of wood will suit if it be straight and sound, and such material can often be obtained locally.

Branched or untrimmed stakes—familiar examples being the culinary pea and Sweet Pea sticks—are, as we have said, unquestionably the best for preserving the natural habit of almost every plant; and these can be had or made into any length, while most kinds of brushwood or undergrowth will answer so long as it is not too old. The advantage of this type of support is soon apparent in the enhanced beauty of development encouraged—especially with bushy habited plants such as Delphinium, Gypsophila, Helenium, and Sidalcea. Furthermore, tying is reduced to a minimum, only an occasional tie being necessary.

Annuals, old Carnation roots, and Pinks of all sorts look well done with birch-broom twigs. Single-spiked plants such as the Hollyhock are neater done with a plain straight stake; so, too, are Canterbury Bells as a rule. Dahlias, also, are truly imposing when done with plain stakes—say strong canes, one to each main growth. Four stakes around any ordinary bushy plant, like a Paeony, for instance, will give a result satisfactory to most people. A good rule is, while not overstaking, always to use enough sticks to keep the shape of the plant. Do not strangle a plant to a single stake when several ought to have been used.—C. T.

STAKING SWEET PEAS.—See *SWEET PEAS.*

STANDARD CHERRIES. — See *CHERRIES.*

STANDARD TREES: PRUNING OF.—See *PRUNING FRUIT TREES.*

STANDISH'S HONEYSUCKLE (*Lonicera Standishii*).—See *CLIMBING AND TRAILING PLANTS.*

STANHOPEA.—See *ORCHIDS.*

STAPHYLEA.—For the best species see *SHRUBS.*

STAR-FLOWER (*Trientalis americana*). See *TRIENTALIS.*

STAR-FLOWERED LILY OF THE VALLEY (*Smilacina stellata*).—See *FALSE SOLOMON'S SEAL.*

STAR HYACINTH (*Scilla amoena*).—See *SCILLA.*

STAR OF BETHLEHEM (*Ornithogalum*, Nat. Ord. Liliaceæ).—Although the genus Ornithogalum is of considerable extent, not many species are met with in general cultivation. The majority of the species are hardy, but some from South Africa are only half-hardy.

Culture.—The hardy sorts are not particular about soil, though they prefer one on the light side. *Ornithogalum umbellatum* will grow in partial shade, and may be planted in grass. The half-hardy varieties must be grown under glass in a cool greenhouse. They like rich, light soil and should be potted up in September or October, and wintered in a cold frost-proof frame. They may be introduced into mild heat in March.

Species:—*Ornithogalum arabicum.*—A fine plant growing about 2 ft. high and blooming in early summer, or under glass in late spring. It has beautiful pure white flowers with a shining black centre, and a delightful scent. Three large bulbs look well in a 7-inch pot. Unfortunately it is a shy bloomer, and it is best to buy bulbs every year, as they need a warm and sunny summer to get properly ripened. It is only half-hardy in the British Isles.

O. nutans.—This has silvery-white flowers, and blooms in May. Its height is 18 ins. Irregular clumps are effective in borders on account of the distinct colour of the flowers, which are loosely arranged in spikes.

O. pyramidale.—This fine plant produces pure white starry flowers in June. Its height is 1½–2 ft.

O. pyrenaicum.—This, popularly known as BATH ASPARAGUS, is not as lovely as some. It bears greenish flowers from May to June, and grows about 2 ft. high.

O. thyrsoides.—This is a fairly tall yellow-flowered species from South Africa, which blooms in June and grows about 15 ins. high. It is not hardy, and must be grown in a cool greenhouse.

O. umbellatum.—This, the COMMON STAR OF BETHLEHEM of English gardens, grows anywhere and increases by self-sown seed very quickly. The flowers are pure white and close early in the afternoon. They are borne in May, on plants 6–9 ins. high.—J. J. & E. T. E.

STAR TREFOIL (*Trifolium stellatum*). See *TRIFOLIUM.*

STAR TULIPS.—See *MARIPOSA LILIES, or STAR TULIPS.*

STARCH HYACINTH (*Muscari racemosum*).—See *GRAPE HYACINTHS.*

STARRY DAISY BUSH (*Olearia stellulata*).—See *CLIMBING AND TRAILING PLANTS* and *SHRUBS.*

STARWORT.—See *ASTER.*

STATICE.—See *SEA LAVENDER.*

STAUNTONIA.—For best species see *CLIMBING AND TRAILING PLANTS.*

STEEPLE-BUSH (*Spiraea tomentosa*). See *SHRUBS.*

STEEPS.—See *SPRAYING MIXTURES AND FUNGICIDES.*

STEGANIA.—Now included in the genus LOMARIA, for which see *FERNS AND FERN GARDENING.*

STEIRONEMA (Nat. Ord. Primulaceæ).—Three species of this genus, *S. ciliatum, S. heterophyllum,* and *S. longifolium,* were once species of *LYSIMACHIA,* as mentioned in that article, and require similar culture, though they are not very suitable for the rock garden. They are hardy herbaceous perennials bearing yellow blooms from July to August, and growing 2–3 ft. in height.

STEM AND LEAF CROPS.—See under CROP REQUIREMENTS in *MANURES.*

STENACTIS.—Now included in the genus *ERIGERON.*

STENOLOMA.—Now included in the genus DAVALLIA, for which see *FERNS AND FERN GARDENING.*

STEPHANANDRA.—For the best species see *SHRUBS.*

STEPHANITIS.—See RHODODENDRON BUG in *INSECT PESTS.*

STERILISER.—This is used in fruit and vegetable bottling. See *FRUIT BOTTLING AND PRESERVING* and *VEGETABLE BOTTLING.*

STERILISING FRUIT.—See *FRUIT BOTTLING AND PRESERVING*

STERILISING SOIL.—See *SOIL STERILISATION.*

STERNBERG'S PINK (*Dianthus Sternbergii*).—See *DIANTHUS.*

STERNBERGIA (Nat. Ord. Amaryllidaceæ).—This is a genus of half-hardy bulbs only suitable for outdoor culture in warm localities and very sunny sites. Pot culture in the cool greenhouse is the best way of growing them, and then there is no difficulty whatever. Light sandy loam is the best of soil. Outdoor planting should be done in April, and potting about July.

What to Grow.—We recommend the following, all of which bear yellow flowers from the autumn right into the winter and grow about 6 ins. high: *Sternbergia colchiciflora, S. fischeriana, S. lutea,* the WINTER DAFFODIL, and its varieties *angustifolia* and *Ikariae, S. macrantha,* and *S. sicula. S. lutea angustifolia,* which is the best bloomer, and *S. macrantha* are practically hardy.

STEWING PEARS.—See list of PEARS FOR BAKING AND STEWING in *PEAR.*

"STIFF" FLOWERS.—See *FLOWERS UNSUITABLE FOR CUTTING.*

STIGMA.—See under LIFE HISTORY OF FLOWERING PLANTS in *PLANT PHYSIOLOGY.*

STINGING NETTLE (*Urtica dioica*).—See *URTICA* and *WEEDS.*

STINK LILIES.—Another name for *CROWN IMPERIAL,* which see.

STINKING HELLEBORE (*Helleborus foetidus*).—See *HELLEBORUS.*

STINKING HOREHOUND.—See *BALLOTA.*

STIPA (Feather Grass. Nat. Ord. Gramineæ).—This is a large genus of hardy perennial grasses. The most useful species is *S. pennata*, the Common Feather Grass, referred to in our article on *Ornamental Grasses*. *S. spartea*, popularly known as Porcupine Grass, may become a troublesome weed, and should be carefully spudded out in its early stages.

STOCKS (*Matthiola*. Nat. Ord. Cruciferæ): — **Annual Species.** — Only one of these is worthy of special mention here, on account of its exquisite fragrance during the evening. This, *Matthiola tristis*, the Night Scented Stock,[1] bears dull white flowers throughout the summer, which are quite unattractive in the daytime. These open out in the evening and are borne on plants about 1½ ft. in height.

Sowings of this species should be made at intervals in the spring and early summer in much the same way as *Mignonette* (see separate article). The site should be carefully chosen so that the perfume of the flowers may be enjoyed when passing along the paths. Thinning out is necessary but must be carefully done. The plants may also be raised and treated as half-hardy annuals.—C. H. C.

Kinds of Stocks.—The following are notes on a few of the best forms of Stocks, varieties being given where possible :—

Bedding Stocks.—For summer flowering the Ten-Weeks Stocks, referred to below, are very favourite for bedding purposes, and next to them come the East Lothian Stocks, also dealt with below. Brompton Stocks and Queen Stocks (see below) are used for spring and early summer bedding but only to a very limited extent.

Brompton Stocks.—These should be sown in May or June for subsequent pricking off or planting out as soon as large enough. They may otherwise be treated in exactly the same manner as the popular East Lothian Stocks referred to below. They are available in pink, purple, scarlet, and white, separately or mixed. The following are the best varieties :—

Old English Scarlet Brompton.—This bears scarlet flowers in May and June, on plants about 2 ft. high.

Sunrise.—This bears flowers varying from coral-red to bright rose. It blooms from May to July, and grows 8–15 ins. high.

Sutton's Carmine Queen. — This bears brilliant carmine flowers in May and June, on plants 18 ins high.

Sutton's Express.—This bears pale rose flowers from May to June, on plants 18 ins. high.

East Lothian Stocks.—These should be sown thinly in boxes in a cold frame in July or August, and pricked off into other boxes as soon as large enough to handle. Later on they should be potted singly into 3-inch pots and wintered in a cold frame or unheated greenhouse. Outdoor planting is best delayed until late March or early April, late April at times proving early enough in very cold Northern districts. Those who live at the coast from Frinton to Peterhead, or indeed farther North, may safely leave established plants outside right through the winter; inland they may survive at the foot of walls in mild winters, but it is better to lift and keep them in frames from November to mid-March to keep the foliage dry. The colour range of these Stocks extends through crimson, lavender, purple, and rose, to scarlet, and there is also a pure white form. The two best varieties are :—

---

[1] *Hesperis tristis*, which forms the subject of our article on *Night Scented Stock*, is a distinct plant and bears purplish, brownish-red, or cream flowers.—Editor.

Crimson Wallflower-leaved.—This bears crimson flowers from May to September, and grows 12–15 ins. high.

White Wallflower-leaved. — This bears pure white flowers, but otherwise resembles the one just described.

NIGHT SCENTED STOCK.—See the notes already given on ANNUAL SPECIES.

QUEEN STOCKS.—These may be sown from May to July, and after being duly pricked off should be protected in a cold frame or greenhouse through the winter prior to planting out in April. They are quite easy to grow and very attractive. The colour range extends from crimson and pink to purple and scarlet. There is also a white form. The best varieties are :—

Spring Bedder.—This bears apple-blossom pink flowers in May and June, on plants 12–15 ins. high.

Sutton's Spring Bedding.—This can be had in light blue, scarlet, or white. It flowers in May and June, and grows 12 ins. high.

TEN-WEEK STOCKS.—As already mentioned, these are the most popular for summer bedding. They are easily raised from seeds grown in the usual way for half-hardy annuals in March, and subsequently pricked off and planted out in May. The colour range is very extensive ; in some of the varieties below there are twelve or eighteen different shades. The best varieties are :—

Giant Perfection.—This is available in twelve distinct colour shades, such as blue, carmine-pink, crimson, delicate pink, pale mauve, purple, rose, terra-cotta, yellow, white, etc. It blooms from June to August, and grows 15–18 ins. high.

Improved Dwarf Large-flowered.—This is available in eighteen colours or colour shades, including all those given under the variety just described. It blooms from June to August, and grows 12 ins. high.

Perfection Ten-week.—There are six or more colour variations of this, such as blue, carmine, rich pink, rose, scarlet, yellow, and white. It blooms from June to the end of September, and averages 18 ins. in height.

Superb Bedding.—This is available in nearly a dozen colours or colour forms, such as blush, peach-blossom, rose, scarlet, etc. It blooms from June to August, and grows about 10 ins. high.

WINTER-FLOWERING STOCKS. — These should be sown in May or June, to flower from Christmas onwards ; they may also be sown in June or July, to bloom in the spring and early summer. Frame treatment may be given in the summer, and the plants transferred to the heated greenhouse in early October. The colour range is very extensive as in most other forms of Stocks. We recommend the following :—

All the Year Round.—This bears white flowers, and is a perpetual flowering sort. Height, 1 ft.

Beauty of Nice.—This can be had in crimson, flesh-pink, mauve, old rose, primrose, yellow, or white forms. It blooms in the winter and spring, and grows about 2 ft. high.

Christmas Pink.—This bears pale pink flowers in the winter and spring, on plants 1½ ft. high.

Queen of Mauves.—This bears pale mauve flowers from December onwards, and grows about 1 ft. high.

Riviera Market.—This may be had in white or rose forms. It blooms from Christmas right through the winter, and averages 1½ ft. high.

Yellow Prince.—This bears pale yellow flowers from Christmas onwards through the winter, and grows about 1½ ft. in height.

Rare Species of Stocks.—A few of the most interesting are briefly described below:—

Matthiola bicornis. — This half-hardy and shrubby species bears purplish-red flowers in the spring on branching stems, and grows about 12 ins. high.

M. fenestralis.—This, also half-hardy and shrubby, bears scarlet or purplish flowers on upright, unbranched stems during July and August. Height, 1 ft.

M. odoratissima.—This, which requires greenhouse protection, bears dull creamy flowers which turn to purplish-brown when old. They are produced on somewhat woody branching stems, during June and July, on plants 1–2 ft. high.

M. sinuata.—The flowers of this biennial or perennial species vary from clear to deep rose, and are produced on upright stems, from May to September on plants 12 ins. high. Its variety *glabra albiflora* is white.

M. tricuspidata.—The flowers of this hardy annual or biennial are rose coloured more or less intensified, sometimes white, and are produced from February to July, on plants 12–15 ins. high.

M. varia.—The flowers of this hardy perennial species are reddish, violet, or green, mixed with reddish-brown, and produced on nearly unbranched stems from May to August. Height, 3–12 ins.—J. F.

STOCKS FOR GRAFTING.—See *FRUIT CULTURE, HARDY: GENERAL CONSIDERATIONS.*

STOKESIA (Nat. Ord. Compositæ). Only one species, an herbaceous perennial, is at all generally grown. This, *S. cyanea,* bears blue flowers in August and September, on plants 2 ft. high. Its varieties *praecox* (blue) and *praecox alba* (white) bloom earlier and are better. It is doubtfully hardy, so should be protected in cold districts in the winter. It succeeds in ordinary light soil, and is propagated by division of the roots in March.

STOKING-UP.

This is an important gardening operation. Light stokings are given usually at intervals of three or four hours throughout the day, but the final stoking, or "banking-up" as it is called, is usually done about 10 or 10.30 p.m. Furnaces differ widely in their nature, but they are usually so constructed that when nearly full they will burn for twelve hours without attention. The use of damp fuel, or the admixture of finely sifted ashes, ground lime, or limestone with the fuel is a great economy and makes the fire last a long time. Further suggestions in this direction will be found in our article on *FUEL ECONOMY.*

In the morning the furnace should be well raked to send the ashes through the grate, and at least once a week (about midday if the weather is very cold) the fire should be allowed to go out for a short time to allow for the furnace, flues and lower furnace where the ash is, being well cleaned out. The chimney should be swept at least twice a year to prevent firing of the soot.

STOMATA.—See under TISSUES and TRANSPIRATION in *PLANT PHYSIOLOGY.*

STONE: ARTIFICIAL. — See *ROCK-WORK.*

STONE ORPINE (*Sedum reflexum*).—See *SEDUM.*

STONE PINE (*Pinus Cembra* and *P Pinea*).—See *TREES.*

STONE AND SOFT FRUIT: GATHERING.—See *GATHERING AND STORING FRUIT.*

STONE AND SOFT FRUITS: GRADING AND PACKING OF. — See *FRUIT: GRADING AND PACKING.*

STORAGE OF ARTIFICIALS.—See *ARTIFICIAL FERTILISERS.*

STORAGE OF LEAVES.—See *LEAVES: GATHERING, STORING, AND USING.*

STORAX.—The genus STYRAX and *S. officinale.* See *SHRUBS.*

STORING BULBS. — See *BULBS: CLEANING AND STORING.*

STORING DAHLIAS.—See *DAHLIA: CULTURE OF.*

STORING FRUIT.—See *GATHERING AND STORING FRUIT.*

STORING VEGETABLES.—See *VEGETABLES: HARVESTING AND STORING.*

STOVE PLANTS.

These require great heat and a constant tropical atmosphere. Houses have to be specially built for them, and large quantities of water have to be thrown about daily to keep the air for ever saturated with moisture.

Our readers will thus see that the culture of stove plants is by no means simple, easy, or inexpensive. Indeed culture of these numerous beautiful subjects is getting less on account of the high cost of maintaining the houses, and the constant care that has to be bestowed on the plants before any reasonable success is obtained.

As our work is a popular work, we have, after careful consideration, decided to exclude the ordinary run of stove plants from its pages, devoting the space they would occupy and much more, to hardy herbaceous plants which are ten times as beautiful and twenty times as useful. The chief greenhouse plants and a few stove orchids are mentioned, but these are of comparatively easy culture even for beginners.—E.

STRANGLE TARE (*Vicia lathyroides*). See *VICIA.*

STRANVAESIA.—For the best species see *SHRUBS.*

STRATIFIED ROCKS.—See under KINDS OF ROCKS in *GARDEN GEOLOGY.*

STRAWBERRIES (*Fragaria.* Nat. Ord. Rosaceæ).—In preparing for these, first give the ground a coat of 6 ins. of well-rotted stable dung; then trench this in 2 ft. deep, working the dung in as the work proceeds. Let the land settle for at least a week, and then tread firmly, raking the surface to get a crumb of fine soil.

Plant out your Strawberries in rows 2 ft. asunder, with the plants 1 ft. apart in the rows. It pays to buy plants in 3-inch pots, as these are well rooted, and, of course, they should not be set deeper than they are in the pots. Where runners are used, plant carefully with a trowel, spreading the fibrous roots well out, and making the soil firm round the crowns. In both cases hoe the ground over when planting is completed, and if possible give a light dressing of long stable dung as a mulch; this will give the plants a good start. The deep trenching enables the plants to resist drought in dry seasons, but watering is sometimes needed. The usual strawing down in early June should be given after a good hoeing.

The beds can be made from August to Christmas. It is a good plan to make fresh beds yearly and to destroy the oldest, as beds over two years of age do not give large fruits. Where strawberries are required for preserving, however, beds may remain for five years. The best preserving berry is *Garibaldi*, sometimes called *Stirling Castle*; its real name being *Vicomtesse de Thury.* In bottling, this variety remains whole.

Reliable Strawberries. — The old variety *British Queen* is omitted, as it does not crop sufficiently well.

Dr Hogg of the same race is preferable. Its fruit is wedge-shaped and of exquisite flavour. Another grand strawberry, *Countess*, is wedge-shaped, and has dark red fruits of extra fine quality, but is not a great bearer. These two may be called epicure fruits. We describe a few of the best varieties below :—

Fillbasket.—Fruit of medium size and of rich fine flavour. Enormous bearer. Mid-season variety.

Givons' Late Prolific.—A grand variety for the final crop. Fruit large, deep red, well protected by foliage,—an important point in a dry season. Flavour very rich. Good bearer.

Hibberd's George the Fifth (not to be confounded with the other Georges).—Fruit similar to *Royal Sovereign*, but much later and of splendid flavour. Berries large, and plant very productive. From the famous Southampton district.

Louis Gauthier.—A splendid sort, with pale pink and white fruits. The first or "King" fruits are very large and cockscomb-shaped. They are round on second gathering, and are produced in enormous quantities. The flesh is soft and pleasant, and the fruits should be gathered direct into the dish. Every gardener should grow this.

Royal Sovereign.—Where only one sort can be grown, this is undoubtedly the best. It comes early, the fruits are large, and the plants continue to bear for a long time. The flavour is fairly rich and the crop enormous.

Sir Joseph Paxton.—Fruits deep red and glossy. A good bearer and quite hardy. First rate when fully ripe. This is a great market variety.

Autumn Bearing Strawberries.—These fruit in the usual season, and again in September and October. Quite a number are now offered; but growers will do well to plant *St. Fiacre*, the fruits of which are very large and fine in flavour. *St. Antoine de Padoue* is another good sort, with smaller but very freely produced fruit. These late berries are useful in shooting time.

Alpine Strawberries. — Of these, which fruit in the autumn, the best are *Rouge Ameliorei* and the White Alpine, with *Bergere* red. They form neat edgings to borders, and can be planted 9 ins. apart each way.—G. B.

NEW VARIETY.

Strawberry The Duke.—This is much earlier than *Royal Sovereign*, also brighter in colour, and sweeter.

STRAWBERRY BUSH (*Euonymus americanus*).—See *CLIMBING AND TRAILING PLANTS* and *SHRUBS*.

STRAWBERRY CLOVER (*Trifolium fragiferum*).—See *TRIFOLIUM*.

STRAWBERRY LEAF SPOT and **STRAWBERRY MILDEW.** — See *DISEASES OF PLANTS*.

STRAWBERRY NETTING.—See under TANNED NETTING in *GARDEN NETTING*.

STRAWBERRY SNAIL.—See under SLUGS AND SNAILS in *INSECT PESTS*.

STRAWBERRY TREE.—The genus ARBUTUS and *A. Unedo*. See *SHRUBS*.

STRAWY MANURE. — See *HORSE MANURE*.

STRAY CATS AND DOGS. — See *GARDEN ENEMIES*.

STREAMLET SAXIFRAGE (*Saxifraga aizoides*).—See *SAXIFRAGA*.

STREPTOCARPUS (CAPE PRIMROSE. Nat. Ord. Gesneraceæ).—This, remarkable for its continual succession of bloom, has been brought to a high state of perfection by careful hybridisation. The hybrids may be had in flower nearly all the year round. They are propagated by seeds in gentle heat in spring, and also by divisions, and should be set in good turfy loam, leaf-mould, and sand. Temperature required, 40–50° F.

Greenhouse Species and Varieties:—*Streptocarpus caulescens.* — Pale blue. Flowers in June. Height, 1 ft.

S. Dunnii.—Pale to bright rosy-red. Flowers in May. Height, 1 ft.

S. Galpini. — Mauve-blue. Flowers in May. Height, 1 ft.

S. New Hybrids. — Various colours. Flowers from May to November. Height, 1 ft.

S. Rexii. — Blue. Flowers in June. Height, 1 ft.

S. Wendlandii. — Blue. Flowers in May. Height, 1½ ft.

NEW VARIETIES.

Streptocarpus Rose Queen.—This has very large, bright rose flowers with a white throat.

S. Southgate White.—This carries two to four flowers on a stem. They are pure white, with a lemon-yellow band to the throat.

STREPTOSOLEN JAMESONII (Nat. Ord. Solanaceæ).—This is a free-flowering evergreen climber or pot plant, and may also be used for mixed borders outside in the summer. It is propagated by cuttings in the spring in mild heat, and should be potted into light, rich loam, peat, and sand. Temperature required, 40–50° F. It bears clusters of bright orange flowers from June to September, and the height is from 2–4 ft.

STRINGLESS BEANS (Tall). — See *BEANS.*

STRIPE ON TOMATOES.—See under TOMATO STRIPE in *TOMATO DISEASES.*

STRONG-SMELLING CLEMATIS (*Clematis orientalis*).—See *CLIMBING AND TRAILING PLANTS.*

STRUTHIOPTERIS.—Now included in the genus ONOCLEA, for which see *FERNS AND FERN GARDENING.*

STUARTIA.—For the best species see *CLIMBING AND TRAILING PLANTS* and *SHRUBS.*

STUD FLOWER (*Helonias.* Nat. Ord. Liliaceæ). — Although not much grown the Stud Flower is well worth including in the herbaceous border, where it will flower freely if a damp, lightly shaded site is provided for it, with a little peat in the soil. The only recognised species now is *Helonias bullata* (Syn. *H. latifolia*), a pretty purple-flowered plant blooming in April and growing about 12 ins. high. Four other species are now united with other genera, and two of these (*H. glaberrima* and *H. laeta*) are described under *ZYGADENUS*, which see.

STYRAX.—For the best species see *SHRUBS.*

SUB-TROPICAL BEDDING. — See *BEDS: SHAPE AND CHARACTER OF.*

SUBSOIL.—See under TRENCHING in *SOIL CULTIVATION.*

SUCCESSIONAL CROPPING. — See under DOUBLE CROPPING OR SUCCESSIONAL CROPPING in *ROTATION OF CROPS AND DOUBLE CROPPING.*

SUCCISA. — Now included in the genera CEPHALARIA and SCABIOSA. See *SCABIOUS.*

SUGAR BEET.

This is one of the Beetroot family, and came into great prominence during the sugar shortage of 1917–1918. It is a very easy crop to cultivate, much easier indeed than ordinary long beetroot. The question of extracting the sugar from the roots is quite another matter, however, and, candidly, we do not recommend amateurs to attempt it. Various lengthy prescriptions have been published instructing one to boil the beet in its skin till soft, then to peel, and finally to cook it well in a boilerette for twelve to twenty-four hours, after which the syrup is stored in air-tight bottles.

But the sugar extracted by this method is not satisfactory, and the syrup does not keep. Used, however, as a second vegetable, sugar beet is most delicious. The present writer grew some on a war plot during 1918, and had it stewed in a similar manner to ordinary beetroot. He was much struck with the delicious flavour, especially when served up with a suitable gravy. The idea that sugar beet is too sickly for this purpose has little foundation in fact, and this useful vegetable is sometimes overlooked by reason of the accounts which have been published of its sickly insipid character.

Culture.—As already pointed out, sugar beet will grow without difficulty. The plant is possessed of a very strong tap-root, and although well-worked soil, trenched to the depth of 1 yd., is the best medium in which to grow it, it will do very well in a soil only dug in the ordinary manner, and its root will find its way through the subsoil to the moisture below. The seed, which is large, should be sown very thinly, one cluster being put at least 9 ins. from the next, and if the clusters are very big they may be broken into two or three pieces. Drills should be taken out about 14 ins. apart and 1 in. deep, the seed being covered after sowing with ordinary soil. When we have made the drills fairly firm we must leave Nature to do the rest.

The time to sow varies with different districts. If the seed is sown too soon and the district be hot and the soil light, the plants will run to seed; then the roots are very similar to iron and quite as difficult to cut! The writer remembers well attending a lecture in a provincial city on the question of sugar beet. The lecturer was unconventional enough to bring some of the beet with him, and he handed round some shredded root on sheets of writing-paper. The audience entered into the spirit of the thing and took a good pinch of the shredded beet, munching this throughout the lecture. They were not struck with the edible nature of the raw beet, but were convinced of its sugar-bearing nature. The lecturer also brought one with him which had run to seed, and offered a large reward to anyone who could cut a small piece out. A number of the audience endeavoured to do so, without result, as the beet, which had run to seed, was too tough to be cut with a knife even of best Sheffield steel. So to return to our point, where the soil is light and the district hot it is a mistake to sow this crop too soon, unless early lifting can take place, for the large roots will be useless if the plants go to seed. About the middle of March is a safe time to begin sowing in districts where the soil is not a hot one, but any time throughout April, until the second week in May, will do for the sowing of the crop.

As soon as the seedlings appear the rows should be thoroughly well hoed. Early thinning is essential should one cluster of seed have produced five plants, as is quite likely. The strongest should, of course, be left and the others removed. They can be transplanted into new ground provided that the long tap-root is kept straight.

The after culture of sugar beet is very simple. No water, no manure, no feeding, and but little cultural treatment save frequent hoeing is required. The only pest that proves troublesome is the Beet Fly, which will be found in our article on *Insect Pests*, and the plant, being a stronger growing one, is but little troubled with any of the diseases which play such havoc among other crops. The roots should be lifted in November before severe frost comes, and stored in a similar way to Carrots.

Variety.—The sort which proved most useful during the sugar shortage above referred to was *Ryder's Saccharina.* The roots of this have a high precentage of sugar in them.
E. T. E.

SUGAR CORN.—See *Maize, or Indian Sugar Corn.*

SUGAR MAPLE (*Acer saccharinum*).—See *Trees.*

SUGAR OF LEAD.—See *Lead Compounds.*

SUGAR PEA (*Pisum Sp.* Nat. Ord. Leguminosæ).—The sugar, or edible-podded pea is not largely grown in our gardens. Yet the unique characteristics of the crop are such that should ensure it fuller notice from amateurs and lovers of vegetables generally, who like their gardens to contain a great variety of distinct yet profitable crops. It is not only in the pods, but also in the colour of the flowers that this type of pea differs from the ordinary culinary pea of our gardens; and as the plants grow to a very considerable height, the ornamental value of a well-grown row is such that should commend them to small owners or others who would think a row of the ordinary peas out of place so near the lawn or flower garden.

Culture.—If given good cultivation the Sugar Pea is a very heavy cropper, but it is important the pods be gathered early, as if they are gathered too late they are worthless for food, while their retention on the haulm prevents the free-setting and development of other pods.

Seed may be sown any time from the middle of March until the end of May, and thin sowing should be followed, an over-crowded row quickly becoming covered with mildew, or failing this, the pods seldom attain full size.

Sticks should be provided early in growth, and during periods of drought water should be applied freely both to the roots and overhead. The pods are cooked whole, nothing but the top and tail of each being removed.

Varieties.—The number of varieties is not numerous, but of late years Messrs Barr & Sons have devoted considerable attention to the improvement of these little-known occupants of our gardens, and have greatly improved the older sorts.—F. R. C.

SUGAR PINE (*Pinus lambertiana*).—See *Trees.*

SUGARBERRY (*Celtis mississippiensis*). See *Trees.*

SULPHATE OF AMMONIA.—See Ammonium Sulphate in *Ammonia and Ammonium Compounds*, and Nitrogenous Manures in *Manures.*

SULPHATE OF IRON.—See under Some Iron Compounds in *Iron and Iron Compounds.*

SULPHATE OF LIME.—See *Gypsum.* See also under Calcium Sulphate in *Lime Compounds.*

SULPHATE OF MAGNESIA.—See Magnesium Sulphate in *Magnesia and Magnesium Compounds.*

SULPHATE OF POTASH.—See under Potash Manures in *Manures*, and see Potassium Sulphate in *Potash and Potassium Compounds.*

SULPHATE OF SODA.—See Sodium Sulphate in *Soda and Sodium Compounds.*

SULPHIDE OF CALCIUM.—See Calcium Sulphide in *Lime Compounds.*

SULPHIDE OF LIME.—See Calcium Sulphide in *Lime Compounds.*

SULPHIDE OF POTASH.—See *Spraying Mixtures and Fungicides*, also under Potassium Sulphide in *Potash and Potassium Compounds.*

SULPHUR DIOXIDE.—See under Sulphurous Acid in *Acids.*

SULPHUR TUFT.—See Harmful Fungi in *Fungi: Edible and Harmful.*

SULPHUR-WORT (*Peucedanum officinale* and *Œnanthe Smithii*). — See *Œnanthe* and *Peucedanum.*

SULPHURIC ACID and **SULPHUROUS ACID.**—See *Acids: Their Uses in Horticulture.*

SUMACH.—See the genus Rhus in *Shrubs.*

SUMBUL (*Ferula Sumbul*). — See *Ferula.*

SUMMER BEDDING PLANTS.—See *Bedding Plants: Selected Lists of.*

SUMMER BEDDING SCHEMES.—See *Bedding Schemes for Summer and Winter.*

SUMMER BLOOMING ROCK PLANTS. See Rock Plants for Summer Blooming in *Rock Plants for All Purposes.*

SUMMER FLOWERING BULBS(for the Rock Garden).—See *Rock Garden Bulbs.*

SUMMER GARDEN, THE.

If we study the four seasons of the gardening year, autumn, winter, spring, and summer, we cannot fail to remark that the summer garden is far the most beautiful of any season's garden. Winter has a barren beauty of its own. Spring has the glorious beauty of a new awakening, when everything is so fresh, in its first unmarred condition of purity and loveliness, when the whole face of nature seems as beautiful as the innocent faces of happy children. Autumn has its lovely colours, its aftermaths, its perfection and yet pathos; for it speaks of the cold winter to come. All the seasons have a beauty of their own, but that of the summer garden excels the others many times over. It is, as I have often said, the superlative season as regards beauty in the garden; the loveliness of the other seasons may seem great, but it is not to be compared with that of the summer garden.

What a joy it is to roam about in a well-worked summer garden! A poet has wrongly said that the most supreme joy anyone can have is to sit under trees and watch the flowers bloom—a pretty idea some will say. But I fear that is not my own feeling nor the feeling of many another who is truly fond of flowers. There is a desire to do more than sit in the shade and watch them grow; there is the desire to be amongst them, to feel their presence, and to see them smiling at us as we go amongst them. If I were a flower I should severely scorn the people who get some one else to do all the work of planning, planting, and tending the needs of flowers. These people, I should think, were not worth wasting my smiles upon, and I should close up my petals and draw up my leaves as they passed.

I wonder why people who do not really love flowers trouble to pay for the production of lovely summer gardens? This is a question which it is not very easy to answer. Certainly the class of person who lolls about in an easy-chair, or lies lazily in a hammock looking at the flowers, and yet not lifting a finger on their behalf, does not, cannot, love them. He may *think* he does. He would be fearfully angry if any one accused him of lack of love for flowers, yet there it is. Perhaps the answer to the question is found in the statement that these people have their gardens planned, planted, and tended by other people on account of a false pride. They think that it is "the thing" to have a lovely garden; it is certainly "the thing" to have "the loveliest garden in the county," and these people feel an inch taller if not two inches when that statement is made by a

Duchess or some other infinitely great personage!

This sort of thing is detestable. People who have this form of pride are always people to be avoided. To see one of these folks lolling about, when close by are masses of lovely flowers speaking or begging for care and personal attention, is a sight worth witnessing once, but not again. It is too painful to experience a second time.

The summer garden, then, should be all beauty and no pathos. Remove the languid, lolling, careless owner of it, and give it your own personal attention as well as any attention it may have to have from a gardener; then you will obtain what is far more precious than any form of riches — a perfect garden.

There will be a glorious lot of colour in this summer garden. It will probably be mostly greenery in the month of May, but in June its glories should commence being boundless. Green will gradually get less and less; it will never wholly disappear, but in July and early August, when the garden will reach its zenith as regards loveliness, there will not be a great deal of green on the surface. Instead there will be mass upon mass of all the colours of the rainbow, and many combined shades of colour as well, all arranged so that they do not clash from whatever spot the garden is viewed. The plants in this perfect summer garden will all of them be the picture of health; they will show that personal love and care have been showered upon them by some one who loves each of them individually. A touch here and a touch there from the loving hand of someone who does it because he loves doing so, and is not paid to touch and often to spoil, will make a mighty difference. Often what is impossible to obtain by the hand of the paid gardener, is accomplished by the man who does it for love.

There will be no dots of indefinite undecided colours in this perfect summer garden. Such are not worthy of a place. There will be splashes of colour, which any real flower lover so often longs to see in the gardens of his friends. There may be fewer varieties this way, but there will be more beauty, which is what we want.

There will be long, long borders, with winsome winding walks or little paths, down which we can wander in the cool of the evening, or for that matter at any time. As we stand at one end of any of these borders we shall be able to see flowers before us, and flowers far far away even in the distance. And this will prove a fitting introduction to joys which are yet to come.

There will be perfect pergolas in this perfect summer garden. Masses of pink, crimson, and white roses of delicious scent will hang down on all sides, and such a picture will probably make us think of the beautiful garden which awaits us in the next world.

In a low part of this lovely summer garden there will be a cool glade and a delightful pool or pond of crystal water. Around this will grow large quantities of lovely, showy water-plants. There will be no temples, garden huts, bridges, or other equally ugly garden paraphernalia to mar the picture of quietness and beauty. There may, it is true, be a neat little garden summer-house hidden away in a nook, or if this cannot be managed, the garden summer-house may be covered with entrancing rambler roses to turn its ugliness into loveliness.

In one part of this lovely garden there will be a spot set apart for simple scents. To this portion we repair when we want our nose to be entranced after our eyes have been blinded by the beautiful colours we have passed. Such a corner should contain all the older pot-herbs, most of which are quite attractive plants as well as easy to grow; and then throughout the summer we shall never lack that happy feeling always experienced by an entrancing odour. Scents are encouraging things. They may take us back years, to some time when we were little children, and we tried to do some great, brave thing—and succeeded. A scent seems to stimulate both mind and body. We are apt to think as we fulfil our every-day tasks at our machine or at our desk, that effort does not really matter, especially if the consequences of failure in any undertaking may not be great. But a delicious scent stimulates us; it makes us decide that we *will* succeed, we *will* do our very best, whatever happens, and after that things come much easier.

Adjacent to the cool, refreshing pond there will be a rambling rockery, where plants can romp and run riot to perfection without ruining or suffocating anything else. Here we shall learn again of the glory of form, and of the magic of colour; we shall see sheets of superb colour—yards of yellow, bands of blue, splashes of purple, carpets of crimson, oceans of white, ridges of rose, and captivating corners of every other lovely colour. If we have not learnt what colour means in our flower borders, we shall learn this here, and there will not be many (except, of course, hardened sinners) who will not give a dear little gasp of ecstasy as they see that perfect rock garden. Bacon has said that "God Almighty first planted a garden," and the Bible tells us that the first garden to be planted was the Garden of Eden. We can make our own garden like the Garden of Eden by massing colours, and though we can never attain anything so truly perfect as God's garden must have been, yet the effort to make it similar will do us much good.

In our perfect summer garden ugliness can have no place. All ugly accessories must either go for good or be completely concealed. Ornateness also is not what we want. Thus we must leave special gardening of such sorts as Chinese Gardening, Italian Gardening, etc., severely alone. I do not think a garden can be perfect in Britain unless it is an all-British garden; British I mean to the backbone as regards its construction, arrangement, and management. We shall probably include plants in it which are not all British, but that does not matter, so long as we keep foreign freak-plants out of it, which plants are often ugliness incarnate, in spite of their novel appearance. Paved paths, fantastic bridges, isolated poles, minaretted summer-houses, Japanese huts, terra-cotta tiles, and other similar innovations should be rigidly kept out of the summer garden if it is to be perfect. The same may may be said of every example of topiary work, and of formal bedding. These may be all right in suitable surroundings, but for pity's sake keep them out of your summer garden, since they, with their frequent hideous ugliness and equally detestable foreign appearance, will completely spoil its effect.

Let things be done "decently and in order," as the Prayer Book says, in the summer garden. Keep things at their best for the longest possible period by avoiding neglect at any time. But let things go their own way and only give support as they require it. Think of the natural way the plants grow in woodlands and hedgerows, and try to retain in your summer garden as much of this beauty as you possibly can.

I must now conclude this rather rambling sketch. You and I, reader, must return to earth and to commonplace things after our chat about, and our view of the summer garden. Word limits are an awful nuisance when one gets talking about summer gardens with all their beauty and their joys, and although we have only touched upon a fringe of this great subject we must, however reluctant we may be, conclude our chat at this point.—E.

SUMMER GREENS.—See *GREENS: WINTER AND SUMMER.*

SUMMER-HOUSE.—See *GARDEN SUMMER-HOUSE,* also *GARDEN FURNITURE.*

SUMMER SAVORY.—See *SATUREIA,* also under SAVORY in *POTHERBS.*

SUMMER SNOWFLAKE (*Leucojum aestivum*).—See *SNOWFLAKE.*

SUMMER SOWING. — See *ALLOTMENTS: MANAGEMENT OF.*

SUN ROSE.—See article on *HELIANTHEMUM,* and see HELIANTHEMUM in *SHRUBS.*

SUN SPURGE (*Euphorbia helioscopia*). See *EUPHORBIA* and *WEEDS.*

SUNDEW (*Drosera.* Nat. Ord. Droseraceæ).—This is a family of dwarf-growing plants suitable for bog, water, or wild gardens. *D. intermedia* is white; *D. longifolia* (Syn. *D. anglica*) is red and white; while *D. rotundifolia,* popularly known as the YOUTHWORT, is white. All bloom from June to July, and average 3–4 ins. in height.

SUNDIALS.—See *GARDEN FURNITURE.*

SUNFLOWER (*Helianthus.* Nat. Ord. Compositæ).—The ANNUAL SUNFLOWERS are at once showy and useful plants in the garden, and the *Giant Russian* and *American* forms, which grow from 5–10 ft. high, have a distinct economic value, inasmuch as the ripe seeds, produced in big, flat heads, are valuable as poultry food, and a useful oil is expressed from them.

Culture.—All the annuals may be raised from seeds sown in March or April out-of-doors, or earlier in pans or pots in a frame or greenhouse. Transplanting is desirable so that the plants may have ample space and develop according to their type. The bushy *Stella* forms need as much room as a Dahlia, and similar support. They bloom freely, and are useful for cutting, or for planting in large beds or among shrubs. We recommend the following:—

Helianthus annuus.—This is the common GIANT SUNFLOWER, producing yellow flowers in the summer and autumn. It grows 5–12 ft. in height, and is useful as a screen to fences. There are several varieties: *Golden Nigger* has a dark centre and deep yellow rays; *Primrose Perfection,* primrose-yellow; and *Sulphur Gem,* pale yellow. There are also double-flowered forms in several shades of colour. The *New Red Sunflower* is a distinct type and has chestnut-red colouring, with yellow tips; there are several variations, and *Langley Gem* (old rose over primrose) is one of the best.

H. argyrophyllus is a yellow-flowered, summer-blooming Texan plant, somewhat like *H. annuus,* but not so useful in gardens. Height, 6 ft.

H. debilis.—This also is a native of Texas. It is a yellow, much branched, summer flowering sort. Height, 4 ft. *H. cucumerifolius* is probably a form of this, and from it the bushy Sunflowers so eminently decorative in the garden have been evolved. These flowers are of moderate size; some have flat florets, and in others the rays are more or less quilled, after the fashion of a single Cactus Dahlia. Of this type some of the best varieties are *Apollo*, yellow and maroon; *Mars*, yellow and purple-red; *Orion*, golden-yellow; *Primrose*, pale yellow; *Princess Ida*, cream-white, with yellow zone; and *Stella*, deep yellow. There are now some bronze-red forms of this group, and a dwarf strain rarely exceeding 1 ft. in height.

Perennial Border Species.—The hardy perennial Sunflowers are very popular plants for herbaceous borders, and would be more so if they did not spread quite as rapidly as they do. Certainly the flowers are glorious, and their beauty adds much to our often golden autumns.

CULTURE.—The perennial sorts are quite as easy to grow as the annuals just given, and are much easier than many other hardy border perennials. The soil should be ordinary well-worked garden loam, enriched with some old manure, and the situation should be sunny. Plant any time from November to March, and where no stem portion is visible on the roots supplied, bury the pieces about 6 ins. in soil. Careful staking is desirable, unless the site is sheltered. The plants grow very rapidly, and frequent ties are advisable in windy districts. They need but little water however hot the season may be, and to mulch them is an unnecessary extravagance.

Propagation is a simple and easy matter. Division of the rootstocks is the best method to adopt, and every bit of underground stem will grow. The work can be done in the late autumn or spring. They may also be raised from seed sown in March or in the summer, the young plants being duly pricked off and planted out in the usual way.

USES.—Perennial Sunflowers are useful both in herbaceous borders and shrubbery borders, as well as in the wild garden. The flowers of most species are splendid for cutting, lasting well in water. The dry stems provide useful fire-lighting material in the autumn and winter.

What to Grow.—If the Sunflower lover will visit a botanical garden in the late summer or autumn he will find a host of sorts to choose from. We recommend the following:—

Helianthus angustifolius.—A bright yellow kind flowering in September and October. Height, about 2½ ft.

H. decapetalus or *divaricatus.*—A yellow or orange-yellow September blooming sort, 5 ft. high.

H. giganteus (also known as *H. altissimus*).—A yellow autumn flowering species about 10 ft. high.

H. laetiflorus.—An attractive yellow August blooming species some 8 ft. high.

H. mollis.—A yellow or orange-yellow species blooming in September till the frost cuts it down. Height about 4 ft.

H. multiflorus.—This is a favourite species of which there are many varieties both single and double. The flowering period is maintained from July to November, and the height averages 5–8 ft. We recommend the following varieties of it: *Bouquet d'Or*, double golden-yellow; *major*, yellow; *maximus*, single golden-yellow; *Queen Victoria*, a splendid double yellow; *Soleil d'Or*, a favourite double yellow; and *The Pearl*, chrome-yellow.

H. orgyalis.—An autumn blooming yellow species about 9–10 ft. high.

H. rigidus.[1]—This is probably the most favourite species of all. Its flowers are various shades of yellow, and it blooms from August until the frost cuts it down, ranging in height from 3–6 ft. There are many varieties. We recommend the following: *Aestivus* (or *japonicus* of the nurseryman), yellow; *Daniel Dewar*, yellow, dark centre; *elegans*, yellow; *grandiflorus*, large yellow; *Miss Mellish* (a favourite orange-yellow variety); *Miss Willmott*, yellow; *praecox*, golden-yellow; and *Rev. C. Wolley Dod*, yellow.

---

[1] The PRAIRIE SUNFLOWER.—EDITOR.

H. sparsifolius.—A first-rate yellow variety flowering in the late summer and autumn. Height about 6–8 ft.

See also *MEDICINAL HERBS*.

SUNNY SITES: ROCK PLANTS FOR.—See ROCK PLANTS FOR SUNNY SITES in *ROCK PLANTS FOR ALL PURPOSES*.

SUPERFICIAL DEPOSITS.—See *GARDEN GEOLOGY*.

SUPERPHOSPHATE.—See under PHOSPHATIC MANURES in *MANURES*, and under CALCIUM ORTHOPHOSPHATES in *LIME COMPOUNDS*.

SUPPLY AND DEMAND.

Perhaps I may be allowed to touch briefly upon the great question of supply and demand in the garden, for many gardeners err about it.

In May and June our crops come on well, and peas will be ready for gathering well before Midsummer Day. Naturally the crop at first is small, but as the summer months go on it gets greater and greater, till the gardener finds he has more than he can deal with at the time. So the crops spoil. This waste can be avoided with a little thought and common sense. Many people leave their young peas on the plants, for instance, till the pods are well filled and until the young peas taste and feel old. It is not good policy to do this, especially considering what a true luxury a dish of young peas is; and it is not wasteful to use them when comparatively young as some imagine, for it avoids the later crop coming all at once and being spoiled as it so often is. Peas should always be eaten when quite young, for then the plants take fresh strength, and indeed are not so exhausted as if the crop had been left on until the pods are filled with hard peas. Moreover, a removal of all suitable pods gives the others a far better chance of being tender when cooked, and, of course, prolongs the crop. If, however, the young peas are left on till they are tough and old it will be found that only quite a few gatherings can be made before the peas are quite uneatable, and if the rows have no more care than a mulch of mowings or manure and an occasional hoeing, the plants will soon have to be pulled up and thrown away. It is genuinely impossible to eat the crop off three or four rows if it is all ready together without letting some of the crop go to ruin as too old. Successional sowings of peas—and my remarks above also apply to beans of all kinds—do not counteract the evil of a glut at one time, for with early sowings it often happens that two rows sown a fortnight after each other come into bearing at the same time. But with later crops the successional sowings act rather well: one finishes a certain row and then goes on to the next one. If carefully managed these later sowings should produce no excess of supply of peas.

The same thing applies to lettuces, radishes, and smaller crops. To take the second first we may say that unless the crop be started when quite young and before it is what gardeners term "ready," a great waste will result in sowing a large bed or long row if there are not a great number of people to consume the crop. To sow "little and often" is by far the best way to avoid this waste, and at the same time to obtain a nice crop of tender radishes. About the lettuce we may say that much should never be sown unless there be a great demand. Many sow a large bed and leave the seedlings in it till they are all ready to eat, and inevitable waste results. Besides this, if one does not actually waste the lettuces, those that are left are tough and not acceptable.

Then there is the common practice of planting out seedling lettuces that they may grow into large plants. Sometimes the average gardener will put out a hundred or a couple of hundred plants at a time. Now this is all very well if one wishes to supply a mansion full of people, but otherwise the gardener should never put so many out together. If he does, it is likely that ever so many of the plants will be ready at the same time. What he is not able to use are likely to " bolt " and then they are no good. If, however, he lands himself—by miscalculating the consumers—with a large batch of lettuces ready to eat, let him see the cook about having a dish sent in as spinach. His supply will then be used ere it spoils.

There are many other instances of how necessary it is for the gardener first to study the demand, and to regulate the supply accordingly, but I have no space left to refer to them here.—E.

SURFACE CROPS.—See *KINDS OF CROPS.*

SURFACE CULTIVATION.—See *SOIL CULTIVATION.*

SURFACE LARVÆ. — See *INSECT PESTS.*

SWAMP ASH (*Fraxinus caroliniana*). See *TREES.*

SWAMP BLUEBERRY (*Vaccinium corymbosum*).—See *SHRUBS.*

SWAMP COTTONWOOD (*Populus heterophylla*).—See *TREES.*

SWAMP HONEYSUCKLE (*Azalea viscosa*).—See *AZALEA: HARDY SPECIES,* and *RHODODENDRON. Rhododendron viscosum* is another name. See *RHODODENDRON.*

SWAMP WHITE OAK (*Quercus bicolor*). See *TREES.*

SWEDES (*Brassica Sp.* Nat. Ord. Cruciferæ).—Although the merits of these as a winter vegetable have long been appreciated by the poorer classes, especially those living in country districts, it was not until the prolonged frosts of 1916 destroyed nearly all the usual winter crops, that the value of the swede as an article for human consumption was brought to the notice of the upper and middle classes.

During that time as much as fourpence was freely paid for a moderate sized specimen, and many who during those weeks tasted swedes for the first time, were so favourably impressed with the table quality, that in many households to-day they are equally as popular as the white or yellow turnip.

Most of our leading seedsmen offer superior strains for gardens, and these should always be grown in preference to the larger and coarser roots grown exclusively for cattle.

Culture.—Seeds may be sown any time from early in May until the beginning of July, the latter sowing being advisable where none but medium sized roots are required, earlier sowings having become too large and the flesh of a woody nature before real wintry weather need be expected. As the roots continue to develop throughout a mild winter, little fear need be entertained of a late sowing being anything but profitable to the grower.

Always select a well manured site for the bed, raking the surface down very fine previous to sowing the seed.

Sow in drills 15 ins. apart, allowing not less than a foot between each plant. Gaps in the run may be filled by transplanting the surplus taken from overcrowded portions of the run.

After thinning out, treat exactly as advised in the article on *TURNIPS.*

Varieties.—Champion Purple Top, Laing's Garden Swede and Lord Derby are good sorts.—F. R. C.

SWEDISH WATER LILY (*Nymphaea alba rubra*).—See *WATER LILIES.*

SWEET ACORN OAK (*Quercus Balloia*). See *TREES.*

SWEET ALMOND (*Prunus Amygdalus dulcis*).—See *NUT CULTURE* and *TREES.*

SWEET ALYSSON (*Alyssum maritimum*), **SWEET ALYSSUM** (*Alyssum maritimum*).—See *ALYSSUM.*

SWEET BASIL (*Ocimum Basilicum*).—See *OCIMUM,* and under BASIL in *POTHERBS.*

SWEET BAY.—The genus LAURUS. See *SHRUBS.*

SWEET BUCKEYE (*Æsculus flava*).[1] See *TREES.*

SWEET CHESTNUT. — The genus CASTANEA, which see in *TREES.* See also under CHESTNUT in *NUT CULTURE.*

SWEET CICELY (*Myrrhis odorata.* Nat. Ord. Umbelliferæ).—This comparatively well-known plant has a pleasant smell of myrrh, and is sometimes known as the BRITISH MYRRH PLANT. Its white flowers, produced in May on plants nearly 1 yd. high, make it useful for mixed and herbaceous borders. Botanically it is a hardy, herbaceous perennial, and thus succeeds under the ordinary treatment usually given to these subjects, though it seems to prefer a somewhat moist, shady spot rather than a dry one in full sun. Propagation can be effected by division of the roots, by cuttings, and by seeds at the usual times, and the best period for planting is March.

SWEET CORN.—See *MAIZE, or INDIAN SUGAR CORN* and *ZEA.*

SWEET FLAG.—See *ACORUS* and *WATER GARDEN : PLANTS FOR THE.*

SWEET GUM (*Liquidambar styraciflua*) See *TREES.*

SWEET LAVENDER (*Lavandula dentata*).—See *LAVANDULA.*

SWEET MARJORAM (*Origanum Majorana*).—See *ORIGANUM.*

SWEET PEAS (*Lathyrus odoratus.* Nat. Ord. Leguminosæ): **History.**—The first mention of this flower in England is a reference to seed sent from Sicily to Dr Uvedale at Enfield in 1699 by Cupani, an Italian monk, and a drawing of a plant grown from Cupani's seed by Caspar Commelin occurs in the *Horti-Medici Amstelodamensis* (1697–1701). This wild variety with purple flowers was first offered for sale in England about 1730. By 1793 purple, white, Painted Lady, "black," and scarlet varieties were catalogued, followed by striped and "yellow" before 1840. A picotee with blue colouring appeared in 1860, said to be a cross with Lord Anson's Pea (*L. magellanicus*), and the firms of Carter, Laxton, and Sutton introduced a few more before Henry Eckford took up the flower and laid the foundations of its present popularity.

Several of his raising are still favourites, *e.g.* Dorothy Eckford, Lady Grisel Hamilton, King Edward VII., etc. Countess Spencer, the first waved Sweet Pea, was raised and exhibited in 1901 by Mr Silas Cole, and Messrs R. Sydenham bought and distributed the stock. In the same year Mr W. J. Unwin raised Gladys Unwin, of somewhat different form, and from these two pinks, especially the former, have come all the modern varieties and improvements.

Cupid or dwarf Sweet Peas originated with Messrs C. C. Morse & Co., at Santa Clara, California; and Bush Sweet Peas, which are of medium height and less robust than the tall type, are also an American introduction. Neither type has found much favour here, probably because our climate is not sunny and dry enough for them.

---

[1] The name SWEET BUCKEYE is sometimes applied to *Æsculus octandra,* but the name is not sufficiently fixed to warrant its general use.—EDITOR.

Winter-flowering Sweet Peas have of late years become popular for market and conservatory use. Said to be derived from the White Blanche Ferry, they have been greatly improved by the Rev. Arkwright, Messrs Engelmann of Saffron Walden, and Zvolanek of New Jersey, U.S.A. The wave form is now established in this type, and a new race of which the fine bicolor Yarrawa is the parent has been raised by Messrs Yates in Australia.

Soil and Situation.—There are two primary essentials to the successful cultivation of Sweet Peas, namely, plenty of light and air above ground, and plenty of depth of good rich soil for the roots below. If these conditions alone exist, a charming display of decorative blossom may be obtained, but, of course, higher culture is needed to ensure really good flowers and a long flowering season. Sweet Peas should be planted in an open, airy, and sunny situation away from other tall subjects. The soil must be well drained and of considerable depth. On shallow gravel or chalk soils and on cold heavy clays, success can only be obtained with hard work; a deep rich loam suits them best, but with careful and thorough tillage exhibition blossoms may be produced almost anywhere.

Preparing the Site.—The soil should be trenched to a depth of at least two spits, even three and four is not too much, and the ground at the bottom of the trench should be broken up and decayed manure added to it. The trench should be not less than 4 ft. wide for a row, and 4 ft. square for a clump. In light soils a layer of fresh manure placed at the bottom of the trench helps to retain moisture, but this practice is not wise unless trenching is done some months before sowing, as Sweet Peas often develop disease, when their roots come in contact with raw manure. In heavy soils the bottom of the trench should be filled in with old, well-rotted manure, burnt earth, road scrapings (free from petrol or tar), and anything likely to help drainage. When the soil lacks lime, it should be added as work proceeds, as should also well-decayed farmyard manure with potash and phosphatic fertilisers. The soil should be replaced as thrown out, adding soot and wood ashes to the top spit, which should be left rough, whereas the other spits should be made firm by treading. For spring planting and sowing, trenches should be got ready in autumn; for outdoor autumn sowing as early in summer as possible, at least six weeks beforehand.

Manures.—Farmyard manure should be used when trenching at the rate of approximately two barrow loads per rod, cow and pig manure on light soils, stable manure on heavy ones. Other organic manures are guano, fowl, and pigeon dung, sewage, and soot, any of which can advantageously be used in liquid form as a stimulant in summer, being applied well diluted once or twice a week after rain or a good watering. Artificials are compounds of phosphorus, potash, and nitrogen. Of the first, basic slag, 3 oz. per sq. yd., should be dug in when trenching heavy land; on medium and light soils substitute bonemeal, 4 oz. per sq. yd., and superphosphate, 2 oz. per sq. yd. This last gives good results as a top-dressing in spring. Potash manures include wood ashes, which should be liberally applied when available. Kainit and sulphate of potash, when obtainable, should be dug in when trenching, using 4 oz. per sq. yd. Flue dust from furnaces, which can be obtained from manure merchants, is said to be good. The writer has not had an opportunity of trying it yet.

Seeds and Sowing.—Obtain sound well-ripened seed, as true as possible, all varieties throwing a certain percentage of untrue flowers. Though germination gets slower, Sweet Peas retain their vitality for several years, and after a wet and cold summer year-old seed often gives better results than that freshly harvested. White and cream sorts have whitish seed-coats (the so-called "black seeded" whites and creams are not true albinos), lavenders and mauves are spotted and often wrinkled. Carmine, crimson, and picotee varieties have very thick coats, and it is often advisable to file or cut through the skin of these to ensure level germination. The cut should never be made where the pea was attached to the pod, as the embryo plant lies there and might be damaged, if not killed.

Sowing.—For exhibition purposes seed should be sown in pots or boxes either in autumn or spring; the former time is becoming every year more popular. One may use 3-inch pots for single seeds, 5-inch for four or five seeds, and boxes for more. Sow from mid-September to mid-November, or in the latter half of January and February, ½ in. deep and 1 in. from seed to seed, in a compost of three parts of fibrous loam, one part leaf-mould or thoroughly decayed manure, and enough sharp sand to keep the soil open. Whites, creams, and all shades of mauve require more sand and less water than other varieties. After sowing, water thoroughly and place in a cold frame on cinder ash or similar material. Keep the frame closed and give no more water till the seedlings appear, then ventilate freely, watering during winter only when the compost shrinks from the sides of the pots. To prevent the roots from freezing in sharp frost plunge the pots in cinder ash. Pot seed, sown in large pots and boxes singly into 3-inch pots about a month after sowing, and, if necessary, repot again in January. Sweet Peas are very hardy as regards temperature; we have known them come safely through a record of 2° F. without protection in calm dry weather when sown outside, but they are very liable to succumb to damp, so that care must be taken not to overwater frame plants and to give them good ventilation, taking the lights off altogether on calm and sunny days.

Outdoor sowings may be safely made on light well-drained soils in the southern half of England in September and October, and will give stronger plants and more flowers than spring sowings, which should be made from mid-February to April, according to the relative warmth of the climate and soil in one's district. Seed should be sown in two rows 18 ins. apart, with 2 ins. from seed to seed, or in rings of 2 ft. diameter for clumps. Sow 2 ins. deep in autumn, rather less in spring, and thin as soon as they are well started to about 6–18 ins. apart, according to the previous treatment of the soil.

Planting Out.—Harden off plants raised in frames during March, and as early in April as possible, when the weather is fine and the soil works well, plant out the young seedlings a foot to 18 ins. apart in double rows or clumps. It is important to plant firmly, and be sure to make the hole deep enough to allow the roots to grow down. We would not advise cutting the roots, as some growers do, unless they are excessively long, in which case it is almost unavoidable. It is a good plan to stake finally when planting; in any case small twiggy sticks should be inserted as first supports for the tendrils. If the ground is very dry, water thoroughly the day before planting.

Staking.—For exhibition plants confined to two or three stems, disbudded and tied, long rods of bamboos or hazel are best. Stout stakes connected by wires should be driven firmly in at intervals along the row, and the rods should be firmly attached perpendicularly to the wires, the shoots as they grow being tied to the rods with raffia. For decorative plantations the tallest and twiggiest bean sticks, preferably elm or hazel, should be inserted very firmly upright on either side of the double row, with shorter twiggy sticks between them to make up for the absence of "spray" at the bottom of the tall sticks. Well-grown Sweet Peas will easily top 12 ft. or more in a season. In windy situations further support with stout stakes and connecting wires should be given. The best artificial supports are wire netting and Simplicitas netting.

Culture under Glass.—Sweet Peas sown early in the autumn may be flowered in a cool house instead of being planted outside. For this purpose they should be potted on as soon as the roots fill the pots. Kept in a cool frame till January, they should then be brought into the house and kept as near the light as possible. Five or six shoots per pot is ample, and these should be confined to one stem and tied to bamboos as they grow. Ventilate the house freely; do not try to force; water regularly, keep a good look out for green fly, which should be checked at once, and give weak liquid manure when in flower. For indoor work the modern waved early flowering varieties are better than the summer flowering type.

Exhibiting.—The following brief *vade mecum* will be found useful. Seed of the best waved varieties should be obtained from one of the many reliable specialists. The National Sweet Pea Society's Classification and Too Much Alike Lists will be helpful in making a selection. Careful and thorough attention to the details of preparing the ground, manuring and planting as already given, is essential, as success depends on a good beginning. Orange, salmon, and scarlet tints should be lightly shaded from bright sunshine, as they are likely to burn, but only lightly: too heavy shading destroys the brilliancy of the flower. Choosing a dry day, cut sprays with four or more flowers well placed on the stem, having the lower two blossoms fully open, the others less forward; do this as early in the day as possible and place loosely in hard water in a cool dark room. When packing squeeze the stems to drain off surplus water, wrap them in oiled paper, then wrap the whole bunch in tissue-paper and label it Pack the bunches firmly in well-ventilated boxes, without crushing, and on arrival at their destination put them in hard water at once with plenty of room. Arrange the sprays lightly and symmetrically in the vases, keeping the least satisfactory as much in the background as possible, and making sure that all are true to name and type. Arrange the vases in as effective a colour scheme as you can, keeping the taller and heavier vases to the back row.

Diseases.—Streak is the worst and commonest of all, and investigation has not yet fully elucidated its cause. It is generally attributed to bacterial infection by the microbe *Thielavia basicola* and no certain cure is known. Plants attacked show the first signs in yellowing foliage, the leaves then turn brown and fall, the stem withers, the whole plant collapses and dies, blackish-brown streaks are found on the stem, the roots have few nodules, and these unhealthy or dead. It is most likely to occur in the case of plants too liberally treated with nitrogenous manures and after over-watering, but cold, excessive drought or rainfall and sudden sharp changes of temperature will bring it on. An adequate supply of lime, phosphates, and potash in the soil tends to make the plants disease-resistant.

Seedling Pea Blight is a black mould which attacks the plant through the root. Fungicides are useless; the plant must be pulled up and the soil treated with quicklime. As preventives apply potash salts and lime. Another incurable disease is Clover Mould (*Peronospora Trifoliorum*), which attacks the leaves on which yellow streaks appear and spread. The foliage then turns brown and falls. Diseased plants should be burnt and the ground dressed with 4 ozs. kainit, 1 lb. basic slag; and before sowing with 3 ozs. superphosphate, ½ oz. sulphate of ammonia, and ½ oz. sulphate of iron per sq. yd.

Mildew on the foliage and stems and Pea Mould on the pods should be treated with a dressing of flowers of sulphur. For Pea Spot (*Ascochyta pisi*), which causes small yellow spots on the leaves that increase in size and run together till the leaves wither and fall, spray with Bordeaux Mixture.

Of pests, green fly is the only one to be feared, and a bad attack ruins the plants. Generally they are little liable to it, but if grown in too crowded or shady a position will suffer badly. Spray with any reliable insecticide several times at short intervals.

Varieties.—The following will be found a reliable selection of modern varieties:—

Bicolor.—Dora, Mrs Cuthbertson.
Blue.—Margaret Fife, Princess Mary.
Blue (dark).—Lord Nelson Spencer.
Blush.—Lady Evelyn Eyre, Mrs Hardcastle Sykes.
Blush, Lilac.—Agricola.
Carmine.—John Ingman.
Cerise Shades.—Edith Taylor, Illuminator, Marion, Sincerity.
Cream.—Dobbie's or Unwin's Cream.
Cream Pink (pale).—Duchess of Portland, Mrs H. Dickson.
Cream Pink (dark).—Margaret Atlee.
Crimson.—Maud Holmes, Mrs C. P. Tomlin.
Fancy.—Charles Foster, Prince George.
Flushed (rose on white).—Marchioness of Tweeddale.
Flushed (rose on cream).—Mrs J. Balmer.
Ivory.—Paradise Ivory.
Lavender. — R. F. Felton, Unwin's Lavender.
Lavender (pale).—Farnham Lavender, W. P. Wright.
Lilac.—Dorothy.
Marbled.—Birdbrook, Helen Pierce Spencer.
Maroon (dark).—King Manoel, Nubian.
Maroon (red).—Lord Fisher.
Mauve.—King Mauve, Mrs J. C. House.
Orange. — Golden Glory, Robert Sydenham.
Orange Cerise.—Fiery Cross.
Orange Pink.—King Alfred.
Orange Scarlet.—President, Thomas Stevenson.
Picotee (cream ground).—Jean Ireland, Mrs C. W. Breadmore.
Picotee (white ground).—Elsie Herbert.
Pink (deep).—Countess Spencer, Hercules.
Pink (pale).—Elfrida Pearson, Mavis.
Purple.—Royal Purple.
Rose.—Old Rose, Rosabelle.
Salmon.—Barbara, Melba.
Scarlet.—Red Star, Scarlet Emperor.
Striped. — Loyalty (blue), Phyllis (orange), Senator Spencer (maroon).
White.—Edna May, Etta Dyke, Nora Unwin, Stanley Crisp.
White (black-seeded). — Constance Hinton.—T. H. D.

Up-to-date Selections.

Adonis.—Rose-pink and salmon.
Advance.—Salmon and pink.
All Bright.—Cerise scarlet.
Ambition.—Lilac.
Anglo.—Yellow, edged pink.
Atlantic.—Pink and amber.
Bonnie Lassie.—Pink flushed and white.
Buy British.—Cream and rose.
Cavalcade.—Red, rose, and salmon-yellow.
Colleen.—Cream and pink.
Dandy.—Pink.
Debutante.—Salmon and coral.
Derby Day.—Crimson.
Ecstasy.—Blush pink.
Elstree.—Pink and cream.
Ethereal.—Peach and rose.
Excelsior.—Orange-scarlet.
Gigantic.—White.
Gladys Improved.—Lavender.
Golden Wings.—Orange-salmon.
Goldfinch.—Gold and pink.
Grand National.—Cream.
Janet.—Rose pink.
Lady Loch.—Pink and white.
Lady Ruffles.—Pink and white.
Magnolia.—Cream.
Marion.—Salmon-pink and cream.
Master-Cream.—Cream.
Mayfair.—Deep pink and white.
Memories.—Rose cerise.
Mollie.—Orange-pink.
My Lady.—Salmon-pink.
Myosotis.—Blue.
Mystic.—Lavender and white.
Orange Flare.—Orange.
Pearl.—Cream.
Pêche Melba.—Rosy cream.
Pink Magnolia.—Pink or salmon-pink and cream.
Porcelain.—Lavender.
Premier.—Bright rose.
Prudence Ryder.—Rose and salmon-pink.
Queen of the Belgians.—Orange-scarlet.
Red Boy.—Crimson.
Rosalie.—Rose.
Rosemary.—Rose and cream.
Rubicund.—Scarlet-crimson.
Sextet Queen.—White.
Shot Silk.—Pink and blue.
Smiles.—Salmon.
Sunrise.—Cerise and orange.
Superfine.—Cream, pink, and salmon.
The Clown.—Crimson on white.
The Colonel.—Orange-scarlet.
The Du Barry.—Carmine-rose on cream.
The Flag Lieutenant.—Blue.
Thomas Seaton.—Orange-crimson.

SWEET PEPPERBUSH (*Clethra alnifolia*).—See *Shrubs*.

SWEET SCABIOUS (*Scabiosa atropurpurea.* Nat. Ord. Dipsaceæ).—This plant is variably described as a hardy annual or perennial. It is much grown as an annual by sowing the seeds in heat, during March, and planting out the seedlings in May, when they flower freely from July till the advent of frost. If sown outside in April some flowers will be produced late in the season; but if sown in June or July the seedlings bloom the following summer like a biennial. The plants grow 2–3 ft. high (except the last in the list below), branch freely, and produce sweet-scented flowers on long stems, admirably adapted for cutting to place in water. A few varieties are named, but most are indicated by the colour. The double varieties are best; the single ones, available in many colours and averaging 2 ft. high, are seldom grown now.

Scabiosa atropurpurea. — Deep crimson. Height, 2–3 ft.

S. a. Azure Fairy.—Pale blue. Height, 2–3 ft.

S. a. Black Prince.—Dark purple or maroon. Height, 2–3 ft.

S. a. Pompadour. — Claret-purple, edged white. Height, 2–3 ft.

S. a. Scarlet King.—Fiery scarlet. Height, 2 ft.

S. a. Snowball. — Pure white. Height, 2–3 ft.

S. a. Tom Thumb or *Dwarf.*—Many colours. Height, 1–1½ ft.

S. a. Yellow Prince.—Pale to bright yellow. Height, 2½ ft.

All the above will bloom freely from July to October.—J. F.

SWEET SEDGE, or MYRTLE GRASS (*Acorus Calamus*).—See *Acorus* and *Medicinal Herbs*.

SWEET SULTAN (*Centaurea Moschata.* Nat. Ord. Compositæ).—This has been greatly improved during recent years, and the newer giant-flowered strain has practically pushed the old type out of the garden. The *Imperialis Section* is probably also a large-flowered strain evolved on similar lines. It has been stated that these have been obtained by crossing *Centaurea Moschata* with *C. Margaritae*, but the latter is now referred to *C. Moschata alba*. *C. suaveolens* has also been suggested as a parent of the newer forms, but this too is a synonym of *C. Moschata*, so the inference is that these beautiful garden plants have been evolved by selection and varietal crossing from *C. Moschata*.

There is great colour range in Sweet Sultans. This extends from pure white to yellow and purple. The long-stemmed flowers, many of which are 3 ins. across, are charming for floral decorations, as they last a long time when cut. They may be raised in the usual way for hardy annuals by sowing out of doors in the autumn or spring. Good named sorts are: *Bridesmaid* (lemon-yellow); *Honeymoon* (bright yellow); *The Bride* (pure white); and *The Bridegroom* (rose-pink, with white centre).

SWEET VERBENA (*Aloysia citriodora* [1]).—See *ALOYSIA*.

SWEET VIOLET (*Viola odorata*).—See *VIOLA SPECIES*, *VIOLETS*, and *WATER GARDEN: PLANTS FOR THE*.

SWEET WILLIAM (*Dianthus barbatus*).—See *DIANTHUS*, and below.

SWEET WILLIAM (*Dianthus barbatus*. Nat. Ord. Caryophyllaceæ).—Though strictly perennial, the Sweet William gives the best results when sown in a cold frame, or outdoors in May or June, transplanted into a nursery bed and put into the flowering position in autumn. Choice varieties may be propagated by layering, cuttings, or division of the roots. When over, the old plants may be removed to a nursery bed, and their places in the beds taken by China Asters or early-flowering Chrysanthemums. The best varieties include:—

Dianthus barbatus Auricula-eyed.—White, zoned with dark colours, white eye, flowering June to July. Height, 1½ ft.

D. b. Harlequin.—Several colours on the same truss. A sort blooming from June to July. Height, 1½ ft.

D. b. magnificus.—A useful double crimson sort, flowering in June and July. Height, 1 ft.

D. b. Sutton's Pheasant's Eye.—Rich crimson, with white eye, flowering June to July. Height, 1½ ft.

D. b. Sutton's Pink Beauty.—Salmon-pink, flowering June to July. Height, 1½ ft.

D. b. Sutton's Scarlet. — Bright scarlet, flowering June to July. Height, 1½ ft.—J. F.

NEW VARIETY.

Scarlet Beauty.—This bears dense heads of bright scarlet flowers having a lighter coloured eye.

SWEET WOODRUFF.—See under WOODRUFF in *MEDICINAL HERBS*.

SWINE'S SUCCORY (*Hyoseris foetida*). See *HYOSERIS*.

SWISS KNAPWEED (*Centaurea Rhaponticum*).—See *CENTAUREA*.

SYCAMORE (*Acer Pseudo-platanus*) — See *TREES*.

SYCAMORE LEAF BLOTCH.—See *DISEASES OF PLANTS*.

SYMPHORICARPUS.—For the best species see *SHRUBS*.

SYMPHYTUM (COMFREY. Nat. Ord. Boraginaceæ).—This is a genus of somewhat coarse-growing tuberous and herbaceous plants, more useful in the wild garden than for the borders, though some favour their use for the last-named purpose, perhaps on account of their extensive flowering period, which lasts for three or four months. Where space is precious, however, there are, we must confess, many better things, and in that case little attention need be paid to the genus.

---

[1] At Kew *Aloysia citriodora* is referred to *Lippia citriodora*.—EDITOR.

Culture.—Not the smallest difficulty will be found in growing these plants if a light soil and a somewhat severely shaded situation be found for them. Paxton says they will do well under trees; we have not tried this situation, but intend to. Propagation is also easy, the best mode of increase being to divide the roots in the autumn or spring, at which times they may be most successfully planted.

What to Grow.—The following are particulars of those which are of very easy culture:—

Symphytum asperrimum.—This is the well-known FORAGE COMFREY, bearing red and blue flowers in July, and growing about 6 ft. high. It is not a plant of much value in the garden.

S. caucasicum.—This is a pretty pale blue sort flowering in June, and growing 3–5 ft. high.

S. officinale (COMMON COMFREY).—This, with its tuberous roots, and white or red flowers in June, on plants 4 ft. high, is not of much value for the garden. It is, however, a valuable medicinal plant. (See COMFREY in our article on *MEDICINAL HERBS*.)

S. orientale.—This is a useful white sort blooming in May and June. It grows about 1 yd. high.

S. tuberosum.—As its name implies, this is a tuberous-rooted sort. It bears quite attractive yellowish flowers in June and July, on plants 3–5 ft. in height.

SYNDESMON.—Now included in the genus *THALICTRUM.*

SYNTHYRIS (Nat. Ord. Scrophulariaceæ).—A genus of low-growing plants, only two of which are worthy of cultivation. These species will thrive in sandy loam, in half-shady positions in the rock garden, and are propagated by division of the roots in the autumn.

Synthyris pinnatifida. — A rich purple-flowered sort, blooming in the summer. Height, 9 ins.

S. reniformis.—A sort with rich violet flowers, blooming in April and May. Height, 4 ins.

SYPHON GOURD.—See *ORNAMENTAL GOURDS.*

SYRENIA (Nat. Ord. Cruciferæ). Only one species of this genus, namely, *Syrenia sessiliflora* (Syn. *S. Lamarckii*), is at all generally grown. This is a hardy, yellow summer blooming biennial useful for the herbaceous or mixed border, as it grows about 1½ ft. high. It will succeed in common garden soil under the treatment usually given to hardy biennials, and is best propagated by sowing seeds in the usual way.

SYRIAN JUNIPER (*Juniperus drupacea*).—See *TREES.*

SYRIAN RUE (*Peganum Harmala*, Nat. Ord. Rutaceæ).—This is distinct from the RUE mentioned in our articles on *POTHERBS* and *RUTA.* It is a hardy herbaceous perennial of the easiest culture, bearing white flowers from June to July on plants 12 ins. high, but, unless the collection is a large one, may be dispensed with.

SYRIAN TOBACCO (*Nicotiana rustica*).—See *TOBACCO PLANT.*

SYRINGA.—For the best species see *SHRUBS.*

SYRINGES.—See *GARDEN APPLIANCES.*

SYRUP FOR FRUIT PRESERVING.—See under BOTTLING IN SYRUP in *FRUIT BOTTLING AND PRESERVING.*

T

TABLES.—See *GARDEN FURNITURE.*

TACSONIA (PASSION FLOWER. Nat. Ord. Passifloraceæ).—This is a free-flowering greenhouse climber, and most suitable for covering the roof of the greenhouse or conservatory. It is propagated by cuttings of half-ripened shoots in the summer, inserted in sandy soil under a frame or hand-light. Pot for success in good fibrous loam, peat, leaf-mould, and sand. Temperature required, 40–45° F.

Greenhouse Species and Varieties.—*Tacsonia exoniensis.* — Sepals and petals brick-red, rose-pink within, violet throat. Flowers from July to August. Height, 3–15 ft.

T. ignea.—Scarlet. Flowers from July to August. Height, 3–15 ft.

T. insignis.—Crimson. Flowers from July to August. Height, 3–10 ft.

T. mixta.—Pink. Flowers from July to August. Height, 3–15 ft.

T. mollissima. — Rose. Flowers from July to August. Height, 3–15 ft.

T. Van-Volxemii. — Crimson. Flowers from July to August. Height, 3–15 ft.

TAGETES.—See *MARIGOLD.*

TALL JUNIPER (*Juniperus excelsa*) and **TALL SILVER FIR** (*Abies grandis*). See *TREES.*

TAMARACK (*Larix pendula*).— See *TREES.*

TAMARISK.—The genus TAMARIX.

TAMARIX.—For the best species see *SHRUBS.*

TAN.

This, also known as TANNERS' REFUSE, consisting as it does almost entirely of bark, is of very little value to the gardener. It only rots down very slowly, and while free from objectionable properties, it should never be used if other material is available. Where, however, the supply is large, a quantity of the tan may be thoroughly saturated with slops as strong as possible, and after being mixed with a small proportion of other vegetable matter, it may be stacked in a heap for six months. If some further strong slops can be poured over the heap every week, by the end of that period some manure of fair quality should be produced for use at the rate of 3 cwt. per sq. rod.

TAN BARK OAK (*Quercus densiflora*).—See *TREES.*

TANACETUM (Nat.Ord.Compositæ). This is an unimportant genus of hardy herbaceous perennials. The best known species is the COMMON TANSY (*T. vulgare*), the culture of which is briefly covered under *MEDICINAL HERBS.* Some of the dwarfer species may be used for the rougher portions of the rock garden, but these are not of sufficient importance to warrant us describing them here.

TANGIER PEA (*Lathyrus tingitanus*).—See *LATHYRUS.*

TANKS: CAPACITY OF.—See CAPACITY OF TANKS OR BOXES under VOLUMES in *ARITHMETIC AND GARDENING.*

TANKS or CISTERNS.

These are made in various sizes and patterns. They are useful for holding water and liquid manure, and more so than tubs or barrels on account of holding a far larger quantity. Galvanised iron tanks and leaden cisterns are the best, as they are rust-proof. A tank should be put in each separate portion of the garden and water laid on. There should be a fair-sized cistern or tank in each greenhouse, in order that the water may become the temperature of the house before use.

TANNED NETTING.—See *GARDEN NETTING.*

TANNERS' REFUSE.—See *TAN.*

TANSY.—See *MEDICINAL HERBS.*

TANSY-LEAVED THORN (*Crataegus tanacetifolia*).—See *TREES.*

TAP-ROOTED CROPS.—See *KINDS OF CROPS.*

TAR.—See *SOIL FUMIGATING.*

TARAXACUM (Nat. Ord. Compositæ).—This is a small genus of weedy tap-rooted herbaceous perennials, the best known of which is the COMMON DANDELION (*T. officinale*, of which a synonym is *T. ceratophorum*). Its uses are described in our articles on *MEDICINAL HERBS* and *SALAD PLANTS*, while its grosser aspect is considered in our article on *WEEDS*. The other two species grown at Kew are not of sufficient importance to be mentioned here.

TARE.—See *VICIA.*

TARRAGON.— See *ARTEMISIA* and *POTHERBS.*

TARRED NETTING.—See TANNED NETTING in *GARDEN NETTING.*

TASSEL FLOWER (*Emilia.* Syn. *Cacalia.* Nat. Ord. Compositæ). —This quaint little plant is found hiding occasionally in catalogues under the name of *Cacalia coccinea*, but its correct title is *Emilia flammea* (Syns. *E. coccinea*, *sagittata*, and *sonchifolia*). In either case the specific name suggests the brilliant orange-scarlet colour of the small blossoms, which are clustered in such a way as at once to suggest the aptness of the name of Tassel Flower. Although an Indian plant, it is quite hardy, and will stand the winter if sown in early September, but an April sowing will prove successful provided the seedlings are transplanted while quite small, root disturbance being resented at a later period. Although not one of the most effective of annuals in the garden, the Tassel Flower is well worth cultivating on account of its novel appearance, and its usefulness for floral decoration when cut.

TASSEL HYACINTH (*Muscari comosum*).—See *GRAPE HYACINTHS.*

TAXODIUM.—For the best species see *TREES.*

TAXUS.— For the best species see *TREES.*

TEA-LEAVED WILLOW (*Salix phylicifolia*).—See *TREES.*

TEA ROSES. — See HYBRID TEAS under ROSES FOR EXHIBITION in *ROSES FOR ALL PURPOSES.*

TEASEL.—See *DIPSACUS.*

TEASEL GOURD.—See *ORNAMENTAL GOURDS.*

TEASEL-HEADED CLOVER (*Trifolium maritimum*).— See *TRIFOLIUM.*

TECOMA (Syn. *Bignonia.* Nat. Ord. Bignoniaceæ).—This includes several beautiful free-flowering climbers, most suitable for rambling over the rafters of a greenhouse. They are propagated by cuttings of ripened shoots taken in autumn in sandy soil under frame or bell-glass with slight bottom heat, and should be set in good loam, peat, and sand. Temperature needed, 40–50° F.

Greenhouse Species :—*Tecoma capensis.*—Orange-scarlet. Flowers in August. Height, 2–10 ft.

T. Cherere.—Orange. Flowers in July. Height, 2–10 ft.

T. grandiflora.—Orange. Flowers in July. Height, 2–10 ft.

T. jasminoides.—White streaked red. Flowers in August. Height, 3–15 ft.

T. radicans.—Orange. Flowers in July. Height, 2–10 ft.

T. speciosa.—Pink shaded purple. Flowers in August. Height, 2–10 ft.

See also *CLIMBING AND TRAILING PLANTS.*

TEESDALIA.—See *PEPPER CRESS.*

TEFF (*Poa abyssinica*).—See *POA.*

TEINTURIER GRAPE (*Vitis vinifera purpurea*).—See *CLIMBING AND TRAILING PLANTS.*

TELEGRAPH PLANT (*Desmodium canadense*).—See *DESMODIUM.*

TELEKIA.—Now included in the genus *BUPHTHALMUM.*

TELEUTOSPORE PHASE.—See *RUST FUNGI.*

TELLIMA (Nat. Ord. Saxifragaceæ).—Only two species of this pretty genus are generally grown. These, *T. grandiflora* and *T. parviflora,* are hardy herbaceous perennials, the former bearing greenish flowers just tinged with pink, and the latter white flowers in April and May, on plants 12 ins. high. They are useful alike for the perennial and rock border, or in the rock garden itself. Their cultural requirements are the same as those of *MITELLA,* on which we devote a separate article.

TEMPERATURE REQUIRED FOR GERMINATION.— See *GERMINATION OF SEEDS.*

TEMPERATURES FOR STERILISING FRUIT.—See *FRUIT BOTTLING AND PRESERVING.*

TEMPORARY HARDNESS.— See *WATER: TO SOFTEN.*

TEN-WEEK STOCKS.—See *STOCKS.*

TENANT'S LEAN-TO GREENHOUSES.— See under LEAN-TO GREENHOUSES in *GREENHOUSES AND FRAMES.*

TENCHWEED (*Potamogeton natans*). See *POTAMOGETON.*

TENDRILLED TRUMPET FLOWER (*Bignonia capreolata*).—See *CLIMBING AND TRAILING PLANTS.*

TENTS.—See *GARDEN FURNITURE.*

TENURE: Security of, for Small Gardeners.—What does Security of Tenure mean to the small gardener? It means more interest, and greater scope for the production of food. In the first place, when a man gets an allotment, as a rule, he does not trouble about the terms he gets it on, but when the time comes for him to think about putting up some kind of a structure, in which to keep his tools, seeds, and other gardening commodities, he has a talk with his pal or next garden neighbour, makes known his plans for building a greenhouse or substantial hut, and then his friend advises him to do nothing of the kind, pointing out the clause in the terms of agreement, which states that six months' notice on either side shall terminate the contract. Now, as a rule, the greenhouse and hut scheme is abandoned, and a nondescript sort of place is erected, as a rule made out of a couple of egg or bacon boxes just large enough to hold the tools. Everything else in connection with the allotment, such as hedges, paths, gate, and water-tubs, is dealt with on the same lines, in fact, a "don't care" style is adopted. Under such conditions as these, good cultivation is practically impossible; interest and ardour are damped; and the gardener is dissatisfied when, as he surveys his allotment, he finds it is not as he intended it to be: his object has been defeated by his not having *Security of Tenure.* And when the bad weather sets in, and as a rule it does in late autumn, he neglects to come to his allotment, as he knows he has no place of shelter in the event of rain or snow. Consequently the vacant ground does not get trenched, or dug, as it ought to be, nor do the growing crops get the attention which is necessary at this time of the year to assist them in battling through the winter. All the time lost during the autumn and winter months is fatal the following year, as the work of trenching has to be done in the spring, as soon as the soil is in a fit condition, which means delay in planting and seed sowing, as the soil is not, as a rule, in a fit condition to plant or sow immediately after trenching. This accumulation of work generally leads to mistakes which are not observed at the time, and subsequent failure of the crops, which means loss of food, and this at any time certainly ought to be avoided.

Now, on the other hand, had this man

been granted "Security of Tenure" in the first place, the greenhouse or substantial hut would have been erected. Interest would have been aroused, and his wife, who will play no small part in assisting him, would set to work at once, and make the interior of the hut nice and comfortable. She would also offer suggestions as to the making of paths, planting the hedges, position of the gate, etc. This is a good start, and augurs well for the future. With nothing to fear as regards eviction, he is not afraid to spend a few extra shillings in making his allotment look smart, neat, and a pleasure to behold; his wife again will take great delight, accompanied by the kiddies, in bringing her husband's tea to the allotment on Saturday afternoon, when he can take it in comfort in the hut, instead of having to walk home, which perhaps is some distance, thereby saving time, and this is very precious to the amateur. Then again he can come straight from work to the allotment, change his boots and clothes in the hut, and commence work at once instead of having to go home first. All these little time-savers may appear of no importance to the onlooker, but they mean a great deal to the amateur who has Security of Tenure. A man under these conditions is comfortable, and his enthusiasm knows no bounds; everything comes quite easy and natural; his crops grow apace, and are a decided success; and when the winter comes he does not mind the weather, as he knows he has a good shelter in the event of a shower. He can always find a job to do in the hut during bad weather, and as soon as conditions are favourable again, he can get on with his trenching or digging. By the time winter sets in he has got all his vacant land dug, and, subject to the frosts and drying winds, it will be in fine condition for planting and sowing when the time comes. It is obvious that the cultivation of the allotment under these conditions will ensure heavy crops, which means more food.

Thus we have seen both sides of this question; on the one side the man hampered at every point through lack of Security of Tenure, and on the other the man helped and encouraged, and producing large quantities of food when given security. Is not this worth trying for? Yes. If so, then it is for every allotment holder to do his level best to get that Security which it is in the country's good that he should have.—J. P.

TERRESTRIAL ORCHIDS.—See under POTTING in *ORCHIDS: POTTING AND WATERING OF.*

TEST FOR AMMONIA COMPOUNDS. See *AMMONIA AND AMMONIUM COMPOUNDS.*

TESTACELLÆ.—See CARNIVOROUS SLUGS in *INSECT PESTS.*

TESTING SEEDS.—See *SEED TESTING.*

TETRAGONIA (Nat. Ord. Aizoaceæ).—This is a genus of annuals requiring to be raised in heat, and hardened off prior to planting outside in rich loam. *T. crystallina* is known as the ICE PLANT, but must not be confused with *Mesembryanthemum crystallinum*, also known by that name, and as the COMMON ICE PLANT (see article on *MESEMBRYANTHEMUM*). *T. expansa* is the vegetable known as NEW ZEALAND SPINACH, the culture of which is dealt with under *SPINACH.*

TETRAGONOLOBUS.—Now included in the genus *LOTUS.*

TETRANYCHUS.—See RED SPIDERS in *INSECT PESTS.*

TETRAPOMA.—Now included in the genus *NASTURTIUM.*

TEUCRIUM (GERMANDER. Nat. Ord. Labiatæ).—A large number of species of this genus have been described, including hardy herbaceous perennials, hardy evergreens, half-hardy or greenhouse herbaceous and tender greenhouse evergreens. In the present notes we confine ourselves to a few of the best hardy evergreen and hardy herbaceous perennials which may be treated as border or rock plants. These are of easy culture, and thrive in ordinary, light garden soil in a sunny site, though in cold districts they often do not survive our winters unless transferred to a frame. They can be propagated in the usual way by summer-sown seeds or spring division of the roots, and spring planting is recommended.

What to Grow.—Some of the following were greatly valued for medicinal purposes in the olden days, and indeed are used still, chiefly as emmenagogues, and for obstructions, etc., in the kidneys :—

Teucrium Arduini.—This bears yellow flowers in July, and averages 1½ ft. in height.

T. aureum.—Syn. *T. Polium*, which see.

T. Botrys (JERUSALEM OAK).—This bears red or reddish-purple flowers in August. It is a biennial or short-lived perennial about 12 ins. high.

T. Chamaedrys. — This is the COMMON GERMANDER, hardly worth growing where space is precious. It bears purplish flowers in July or August, and grows about 9–12 ins. high.

T. flavum.—This bears yellow flowers in August, and averages about 1 yd. in height.

T. Marum (CAT THYME).—This bears light, lilac-purple flowers in July and August, and grows 1½–2 ft. in height.

T. multiflorum.—This is one of the best sorts, bearing as it does pale red flowers in August. It grows about 12 ins. high.

T. Polium (Syn. *T. aureum*).—This is popularly known as POLY GERMANDER, but is perhaps more suitable for the wild garden, where space in the border is precious. It bears pale purple flowers from August onwards, and averages 12 ins. in height.

T. pyrenaicum.—This is more useful in the rock garden than in the perennial border, though a little tender in most districts. It bears creamy-white flowers from June to July, and grows about 6 ins. high.

T. Scorodonia.—This is the well-known WOODSAGE, which see under that name in our article on *POT-HERBS*. It is more suitable for the herb border or kitchen garden than for the perennial parterres.

See also *SHRUBS*.

THALICTRUM (MEADOW RUE. Nat. Ord. Ranunculaceæ).—These are both attractive foliage plants and noble flowering subjects for the hardy herbaceous or perennial border. They are exceedingly useful also for margins of shrub borders, for the wild garden in sun or light shade, and one, notably *T. alpinum*, is useful in the rock garden. The tall sorts are splendid for the back rows of borders, and the fern-like foliage of most of them makes the plants useful for additions to bouquets where Asparagus Fern or other foliage is not available. They succeed in ordinary light, rich, cool, sandy garden soil, doing best when this is enriched with vegetable matter instead of dung, and are not hard to propagate by division of the roots in the autumn or spring, at which last period planting may most successfully be carried out. A very large number of species have been described, and of them we recommend the following :—

Thalictrum adiantifolium.—Syn. *T. minus adiantifolium*, which see.

T. alpinum.—This is a useful dwarf sort for the rock garden bearing white or whitish-yellow flowers in June, and growing only 6 ins. high.

T. anemonoides (RUE ANEMONE).—This bears pretty white flowers in April and May, on plants 12 ins. high.

T. angustifolium.—This useful sort bears pale lemon-yellow flowers from June onwards, and grows 1 yd. high.

T. aquilegifolium.—This and its variety *atropurpureum* bear pale and dark purple flowers respectively in June and July, and have foliage much like that of the Aquilegia. Both average 1 yd. in height. The white variety *album* is very pleasing.

T. atropurpureum.—This nurseryman's sort is not a species but the variety *atropurpureum* of the above.

T. Delavayi.—This is a useful free-blooming light purple sort flowering from June to September, and averaging 3–7 ft. high.

T. dipterocarpum.—This useful sort bears rosy-purple flowers in July and August, on plants 3–6 ft. high.

T. flavum.—This, the Common Meadow Rue, or Meadow Rue, with its orange flowers in June, is not much grown, but may be planted in the wild garden, where it will grow about 4 ft. high.

T. glaucum (Syn. *T. speciosum*).—This is a useful sort bearing yellow flowers in June, and growing 5 ft. high.

T. majus.—This bears unattractive yellowish-green flowers in June, and is only useful in the wild garden. It grows 3–6 ft. high.

T. minus.—Nearly a dozen varieties of this yellow June flowering species are grown at Kew, all of them varying from 1–4 ft. in height. *T. minus adiantifolium* (Syn. *T. adiantifolium*) bears greenish-yellow flowers; *T. m. elatum* is a pale yellow sort; *T. m. purpurascens* is pale purple; and *T. m. saxatile* (Syn. *T. saxatile*) bears red and white blooms.

T. pratense.—Syn. *T. flavum* above.

T. purpurascens.—This bears pale purple flowers in June, and grows about 1 yd. high.

T. saxatile.—Syn. *T. minus saxatile* above.

T. sparsiflorum.—This nursery sort is probably a dwarf strain of *T. glaucum.* It bears yellow flowers in June, and grows about 3 ft. high.

T. speciosum.—Syn. *T. glaucum* above.

T. tuberosum.—This is a white tuberous-rooted sort flowering in June, and growing 1½ ft. in height.

THE OLD MAN'S CACTUS (*Pilocereus senilis*).—See *Cacti*.

THERISIA.—Now included in the genus Fritillaria. See *Fritillary*.

THERMAL CONSTANT.—See *Germination of Seeds*.

THERMOMETERS. — See *Fruit Bottling and Preserving* and *Garden Appliances*. See also *Arithmetic and Gardening*.

THERMOPSIS (Nat. Ord. Leguminosæ). — This is a small genus of hardy herbaceous perennials not very generally grown but deserving of more attention than has up to now been bestowed upon them. They succeed in light, rich, sandy soil and are best propagated by seeds sown in the usual way in the summer. In cold districts they do not winter successfully outside, and thus planting out of new stock should be delayed till mid-March. We recommend the following:—

Thermopsis barbata.—This bears purple flowers from June to July, and averages 1½ ft. in height.

T. caroliniana.—This is a useful sort bearing yellow flowers in June and July. It grows 1½ ft. in height.

T. lanceolata (Syn. *T. lupinoides*).—This is a useful yellow June blooming sort, growing 1–1½ ft. in height.

THIMBLE-BERRY (*Rubus occidentalis*).—See *Shrubs*.

THIN SOWING.—See under General Management in *Vegetables: General Considerations*.

THINNING FRUIT.—See *Fruit Culture, Hardy: General Considerations*.

THINNING OF CROPS.—See under General Management in *Vegetables: General Considerations*.

THISTLE.—See *Carduus* and *Cnicus*. See also Common Sow-thistle and Creeping Thistle in *Weeds*.

THLASPI (Bastard Cress. Nat. Ord. Cruciferæ).—This is a large genus of hardy annual and perennial cress-like plants hardly worth growing. The best known species is *Thlaspi arvense*, popularly called PENNY CRESS.

THORN.—A name applied to the genus CRATAEGUS. See *TREES*.

THORN APPLE.—See *DATURA* and *MEDICINAL HERBS*.

THREE-LEAVED NIGHTSHADE.—See *TRILLIUM*.

THREE-YEAR ROTATION.—See *ROTATION OF CROPS AND DOUBLE CROPPING*.

THRIFT.—See *ARMERIA*.

THRIFT PINK (*Dianthus Armeria*).—See *DIANTHUS*.

THRINCIA.—Now included in the genus LEONTODON.

THRIP or BLACK FLY.—See *INSECT PESTS*.

THRIPIDÆ.—See THRIP OR BLACK FLY in *INSECT PESTS*.

THROAT-WORT.—See *TRACHELIUM*.

THUNBERGIA.—For best species see *CLIMBING AND TRAILING PLANTS*.

THUNIA.—See *ORCHIDS*.

THUYA.—For the best species of this see *TREES*.

THYME.—See *POTHERBS* and *THYMUS*.

THYME-DODDER.—See *DISEASES OF ROCK PLANTS*.

THYME-LEAVED HAREBELL (*Wahlenbergia serpyllifolia*).—See *WAHLENBERGIA*.

THYMUS (THYME. Nat. Ord. Labiatæ).—This is a well-known genus of fragrant plants, which are easily grown on rocky banks or ledges, and are propagated by division of the roots in autumn or spring. The best species are :—

Thymus azoricus.—This is a diminutive shrub with evergreen leaves. Flowers purple. Site, half-shade. Soil gritty. Flowering Period, June to July. Height, 2 ins.

T. carnosus.—This is an erect-growing shrubby species with greyish leaves. Flowers white. Site sunny. Soil gritty loam. Flowering Period, August and September. Height, 9 ins.

T. Serpyllum (WILD THYME).—This is the well-known creeping plant with scented foliage. Flowers rose-purple. Site sunny. Soil gritty. Flowering Period, June to August. Height, 2 ins. There are numerous garden varieties of this.

For culture of Garden Thyme, see THYME in our article on *POTHERBS*.

THYROSTACHYS.—See *BAMBOOS*.

TIARELLA.—See *FOAM FLOWER*.

TICK TREFOIL.—See *DESMODIUM*.

TICKSEED.—See *COREOPSIS*.

TIDY TIPS (*Layia*. Nat. Ord. Compositæ).—It is difficult to understand how these plants came by this name. The hardy annuals, which are the most frequently grown, are of lowly growth, easy cultivation, and seem to be waiting for the skill of some patient cultivator to bring them into greater prominence and beauty. Garden soil of average quality suffices them, but to secure a long season of bloom two sowings should be made out of doors, one in April and one in September. We describe the three best species below :—

Layia Calliglossa (Syn. *Oxyura chrysanthemoides*).—This very free-blooming sort bears yellow flower-heads which are white-margined and golden-centred. It blooms all the summer, and grows 1 ft. high.

L. elegans.—This is of spreading habit. It produces yellow flower-heads throughout the summer, and grows 8 ins. high.

L. glandulosa (Syn. *L. neomexicana*).—This useful sort bears white flowers throughout the summer, and grows about 1 ft. high.

TIDYING UP.—See *AUTUMN GARDEN, THE*.

TIGER IRIS (*Tigridia*. Nat. Ord. Iridaceæ).—This is a pretty bulb, hardy only in the warmest districts, and thus is best taken up each autumn and wintered indoors. It may be grown in pots in the cool greenhouse or in well-sheltered sunny borders of light rich soil, and may be propagated either by seeds or bulbils.

What to Grow.—We recommend the following which bloom from May to July, and average 12 ins. high; for full descriptions and extensive colour range bulb specialists should be consulted: *Tigridia Pavonia*,[1] the PEACOCK TIGER IRIS, *T. Pringlei*, and *T. violacea*.

TIGER LILY (*Lilium tigrinum*).—See *LILIES*.

TIGER MOTH.—See *INSECT PESTS*.

TIGRIDIA.—See *TIGER IRIS*.

TILIA.—For the best species see *TREES*.

TIME REQUIRED FOR GERMINATION.—See *GERMINATION OF SEEDS*.

TIME REQUIRED FOR VEGETABLE STERILISATION.—See *VEGETABLE BOTTLING*.

TIMOTHY (*Phleum pratense*).—See *FHLEUM*.

TIPULIDÆ.—See LEATHER JACKETS in *INSECT PESTS*.

TISSUES.—Notes on various kinds of PLANT TISSUES will be found in our article on *PLANT PHYSIOLOGY*.

TOAD.

This is the gardener's best friend, feeding on slugs and insects. It should be encouraged and protected instead of being banished from the garden as is so often the case.

TOAD FLAX (*Linaria*. Nat. Ord. Scrophulariaceæ).—These popular garden plants have double-lipped flowers which at once suggest the Antirrhinum or Snapdragon, to which they are related. Usually they are about 1 ft. high and free-flowering. The plants are useful for bedding or as marginal groups to larger subjects. Raisers have greatly improved some species, notably, *Linaria maroccana*, and produced several colour varieties. If flowers are needed over a long period, sowings should be made in autumn and in spring.

Annual Species.—*Linaria bipartita* (Syns. *L. caerulea, incarnata, speciosa*). — A purple, summer-flowering sort. Height, 1 ft.

L. maroccana.—An old garden plant with violet-purple flowers, and about 9 ins. high. Good garden forms are:—*Excelsior* (a strain with varying colours); *Golden Gem* (yellow); *Queen of Roses* (rose-carmine); *Snow Queen* (white); and *White Pearl* (white).

L. reticulata. — A purple and yellow sort, blooming freely in the summer. Height, 18 ins.

L. spartea (Syn. *L. juncea*).—A yellow sort, blooming in summer. Height, 12 ins.

L. tristis (Syn. *L. marginata*).—A brown and yellow summer-blooming sort. Height, 12 ins.

Perennial Border Species.—These are hardy herbaceous perennials, thriving in ordinary light sandy garden soil, and propagated by seeds, cuttings, and division at the usual times. Excluding those which are half-hardy, we recommend the following, most of which spread somewhat rapidly:—

Linaria dalmatica.—This useful sort bears yellow flowers from June to August, and grows 2 ft. high.

L. galioides.—This is a pretty blue July blooming sort about 18 ins. high.

L. purpurea.—This bears purple flowers from August onwards, and averages 12 ins. high.

L. repens.—This is a spreading species bearing purple flowers from July onwards, and grows about 1–2 ft. high.

L. vulgaris.—This is the common Toad Flax of the fields and woods, bearing yellow flowers in August, and growing 12–18 ins. high. Its variety *Peloria* is also yellow, but its height rarely exceeds 12 ins.

---

[1] There are a host of garden forms of this species.—EDITOR.

Rock Garden Species.—Three are suitable for the rock garden. The perennial is propagated by division in the autumn or spring. The annuals may be raised from seeds sown in heat in March.

Linaria alpina.—A free-flowering tufted plant. Flowers rich purple and orange coloured. Site sunny. Soil gritty loam. An annual, flowering from June to September. Height, 3 ins.

L. origanifolia.—A trailing species with hairy leaves. Flowers violet with yellow throat. An annual, flowering in June. Height, 3 ins.

L. pallida.—A creeping perennial plant. Leaves zoned with white. Flowers purple. Site, half-shade. Soil moist. Flowering Period, May to September. Height, 6 ins.

New Variety.

Linaria dalmatica speciosa.—This bears bright yellow flowers, on long branching spikes.

TOAD LILY (*Tricyrtis.* Nat. Ord. Liliaceæ).—Only three species of this are generally grown. These, *T. hirta* (Syn. *T. japonica*), *T. macropoda*, and *T. pilosa* (Syn. *T. elegans*), bear white, yellow, and greenish flowers, usually marked with purple or red in September and October, on plants 1–2 ft. high. They are hardy only in the warmer parts of the British Isles, and are best grown as half-hardy bulbs in the cool greenhouse in colder districts, any light peaty soil being suitable. As there are many more beautiful subjects, where space is precious it should not be taken up with them.

TOAD RUSH (*Juncus bufonius*).—See *JUNCUS*.

TOADSTOOL.—A popular name for several species of poisonous fungi.

TOBACCO PLANT (*Nicotiana.* Nat. Ord. Solanaceæ).—Although it is not supposed to be permissible to grow more than a dozen tobacco plants in each garden in any one season, this rule is never enforced, since the authorities realise, if enthusiastic amateur gardeners who love their pipes do not, that tobacco growing in this country is not a profitable or successful undertaking at all. Recently one amateur wrote the writer saying he was proposing to turn the whole of his allotment into a tobacco field and grow his own, since he could not get what he wanted at the shops. Needless to say he was urged not to do so, since if tobacco is to be grown successfully a very much hotter climate than ours is required. However, if not grown for smoking, the plants should certainly be grown for garden or greenhouse decoration, and they may be treated in either of two ways: raised as half-hardy annuals and planted out, or grown as indoor plants in cool greenhouses.

Of sorts to grow *N. affinis* is the one most often listed. This, however, is the incorrect name of *N. alata*, the well-known white-flowered plant emitting a pleasing scent in the evenings during August and September. Hybrids are available in several colours, and the height averages 1½–3 ft.

Less useful sorts so far as English gardens are concerned include *N. rustica*, which is the SYRIAN TOBACCO, and *N. Tabacum* (Syn. *N. macrophylla*), the VIRGINIAN TOBACCO. From the leaves of these two plants the tobacco of our cigarettes, cigars, and pipes is made.

TOBACCO WASH.—See *INSECT PESTS: GENERAL METHODS OF DESTRUCTION.*

TODEA.—For the best species see *FERNS AND FERN GARDENING.*

TOFIELDIA.—See *FALSE ASPHODEL.*

TOMATO (*Lycopersicum esculentum.* Nat. Ord. Solanaceæ). — The cultivation of the Tomato has extended enormously, and with suitable houses there is no difficulty in keeping up a regular supply all the year round. The difference in quality of fruits which are allowed to ripen on the plants is apparent to the most inexperienced. The first sowing should be made in January in a light compost, standing the pots in a nice light position near the glass. As soon as the seedlings are well through the soil, pot off singly into small pots, using equal parts of loam and leaf-mould, with a fair sprinkling of sharp silver sand. Pot off the plants again as soon as the roots are nicely through the soil, placing them later into well-drained 8- or 10-inch pots. Pot-culture is the best for early supplies, and also for supplying fruits from December to April. Use a stronger compost for the final potting, of three parts loam, leaf-mould, and a little sand and lime rubble. Above all, pot firmly.

Maintain a fairly dry and buoyant atmosphere, and fertilise the earliest flowers with a camel hair brush, also those grown on plants for winter supplies. Keep the night temperature in winter as near 55° F. as possible, and about 65° F. by day. Stimulants should not be supplied in any form until after the fruits are set, and nothing beats diluted liquid manure, or a light dressing of superphosphate. Ripe fruits may be expected at the beginning of May from seeds sown in January; sowings made after that date may be planted out in almost any kind of house, or potted on with good results.

Sow seeds the end of June and July for winter and early spring supplies, and encourage the plants to make a strong, sturdy growth by free ventilation until the first trusses of fruit are set.

Varieties.—There are so many good varieties, and new varieties are constantly being raised, that selection is difficult.

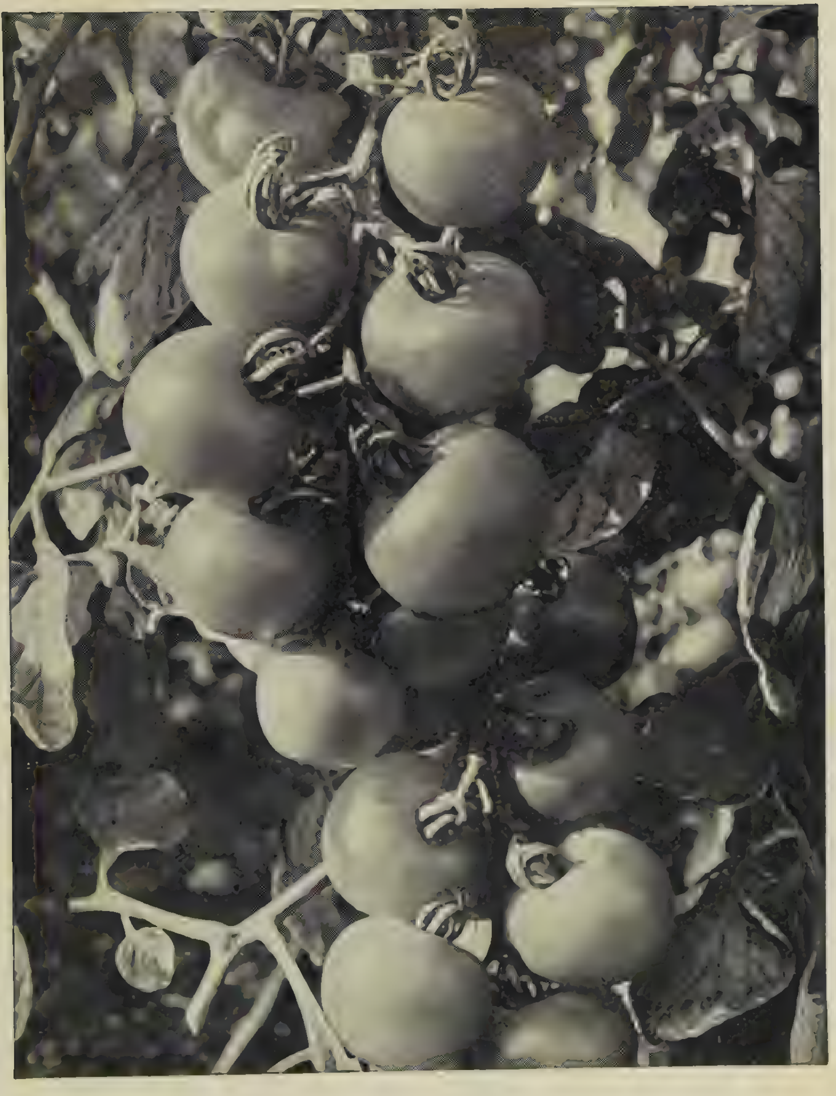
Carter's Sunrise for January sowing, and *Sutton's Winter Beauty* for July sowing, are hard to beat. Other good varieties are: Moneymaker, Kondine Red, Best of All, Bide's Recruit, Ailsa Craig, and Paragon. *Golden Queen* and *Sutton's Peach Blow* are handsome fruits, and well worth growing.

F. J.

TOMATO DISEASES.

There are a number of diseases which attack the Tomato, and these being of some importance we treat them in an article to themselves rather than include them in the article on *DISEASES OF PLANTS.* The avoidance of an overdamp house, and of overfeeding, and the maintenance of healthy growth by hygienic conditions are the best ways of preventing disease attacks, though at times with every care plants go under.—EDITOR.

Tomato Bacteriosis (*Bacillus solanacearum*).—Owing to its having been confused with "Stripe," a good deal of uncertainty exists as to the extent of this disease in Britain. In the shoots the symptoms are somewhat similar to Stripe, namely dark markings, but this is succeeded by a wilting which does not occur in Stripe. A soft rot is said to be produced in the fruit. It should be remembered, however, that bacterial decay of tomato fruits is very common, as bacteria are very easily introduced through wounds, insect punctures, etc. In these cases the decay usually takes place at the



SUNRISE TOMATO

apex of the fruit where the withered flower is apt to hang on. In the true bacteriosis the bacteria are present in the shoots, and are believed to pass through the stalk into the young fruits.

REMEDIES.—Little at present can be recommended. Affected shoots should be cut off and burned, and seed saved only from healthy plants.

Tomato Canker (*Mycosphaerella citrullina*).—A very serious disease, but local and on the whole rare. It is distinguished by the presence of white, often sunken patches on the stem of the plants, either at ground level or higher up. Wilting follows, and the plants usually die. Minute black spots (the fruits of the fungus and containing innumerable spores) are produced on the white patches, and hence the disease is readily spread by such agencies as insects, splashing of water, and handling. Cucumbers are also affected.

REMEDIES.—Affected parts should be carefully uprooted and destroyed by fire as soon as ever the disease is noted. Sturdy growth, induced by good cultivation and plenty of air, helps the plants in resisting attacks. Affected soil should not be used for Tomato or Cucumber growing unless thoroughly sterilised by steam or chemicals.

Tomato Leaf Rust (*Cladosporum fulvum*).—Most destructive to tomatoes under glass. Pale yellow patches appear on the upper surface of the leaf, and the under-surface becomes covered with a dull-brown, velvety mass of spores. These readily infect neighbouring plants, and the disease spreads with great rapidity.

REMEDIES.—Good ventilation and a dryish atmosphere are essential. Remove badly attacked leaves and apply a fine sulphur powder with a sulphurator. Burgundy Mixture may also be used. In very bad cases one or two side shoots should be encouraged so as to produce fresh foliage to assist in development of fruit.

Tomato Leaf Spot (*Septoria Lycopersici*).—A serious disease in America but rare and local in this country. It is characterised by the presence on the leaves of small, round dark spots which later become grey. From these spots spores are produced in profusion, which spread the disease. In Britain it has only been observed under glass, where it may cause much damage.

REMEDIES.—Little experimental work has been done in this country. Where the disease is liable to occur Burgundy Mixture or Bordeaux Mixture should be used as a preventive. When present the affected plants should be destroyed, and the remainder sprayed with a good fungicide to prevent as far as possible further infection.

Tomato, Potato Blight on.—See article on *POTATO BLIGHT*.

Tomato Sleeping Disease (*Verticillium albo-atrum* and *Fusarium Lycopersici*).—This, which is by far the most serious of all tomato troubles, often occurs in epidemic form and kills off in the big tomato-growing districts thousands of plants under glass. The fungi causing the disease enter the plants from the soil, probably through wounds on the roots or at the collar, and invading the woody tissues develop abundantly, blocking up the water-conducting vessels, and thus causing a " wilt " and sudden collapse. Plants affected in this way are past recovery as the tissues are thoroughly permeated with mycelium. Though Fusarium and Verticillium are the fungi most commonly found it is not impossible that other fungi may enter the plants through minute wounds and behave in the same way.

Remedies.—As the fungi causing Sleeping Disease occur in the soil, it is of the utmost importance that soil or manure containing the spores should not be used for tomato growing. All diseased plants should be removed by the roots and burned. Contaminated soil may be sterilised by heat or by the use of chemicals, but where new soil can be obtained it is best to employ it.

Tomato Stripe.—One of the most destructive of Tomato diseases. The cause is still obscure, hence it is impossible to prescribe remedies or even suggest preventive measures. The disease is characterised by dark streaks or discolorations on the stem which are visible externally; the leaves are also affected and the fruits blotched. No parasitic organism has yet been discovered as causing "Stripe," but the evidence, which so far points to its being contracted from the soil, is suggestive of a parasite. It is believed that Stripe is not communicated by the seed.—A. D. C.

TOMATO HOUSES.—See Cucumber and Tomato Houses in *Greenhouses and Frames.*

TOMATO : Outdoor (*Lycopersicum esculentum.* Nat. Ord. Solanaceæ).—Whether this be regarded as a fruit or a vegetable, it is very certain nothing is more popular among all classes, hence the reason that even the cottager having no "glass" invariably finds room for a few plants, and though his effort may not always meet with the success expected, this is more often due to the lack of understanding important details than to the variety or even our most abused climate.

Culture.—For many years past we have grown these with great success against banks, fences, walls, or in the open garden, and certainly regard them as being one of the most profitable crops.

A start should be made with strong plants (raised as advised in a previous article) about the last week in May, selecting a sunny position where a fairly heavy dressing of manure has previously been dug in. Tread the soil extra firm before planting, and again after new roots and top growth have been made. Keep each plant to a single stem, removing all side shoots as they appear. Do not be too generous with the watering-pot, and on no account apply stimulants of any kind until each plant has set a fair amount of fruit.

In a dull season, nip out the top of the plant at the second leaf beyond the third truss of fruit and gather all fruits as soon as they approach the ripening stage. If this is not done many will crack. Avoid cutting away the leaves until the end of August, after which date, instead of taking off a whole leaf, take only half, allowing the remainder to stay until the middle of September.

Varieties.—The following are good: Early Morn, Evesham Wonder, First Crop, Ideal, Kondine Red, Moneymaker, and Victory.—F. R. C.

Up-to-date Selections.

Tomato Blenheim Orange.—Orange flesh.

T. Duke of York.—Firm scarlet flesh.

T. Epicure.—Fine alike indoors and outside.

T. Fruit.—Heavy bearer, with firm flesh.

T. March Beauty.—Fine for forcing.

T. Outdoor.—Best outside on allotments.

T. Yellow Sunrise.—Fine fresh colour.

T. Open Air.—A fine hardy form.

T. Golden Glory.—First-class quality.

T. Salad Gem. — Splendid for salads.

T. Tip-Top.—A big bearer.

T. Abundance.—Fine for forcing.

T. Best of All. — An immense yielder.

T. Earliest of All.—An extra early sort.

T. Early Market.—Best for market men.

T. Everyday.—Skin smooth, and rich red colour.

T. Golden Nugget.—Golden-yellow. Fine flavour.

T. Golden Perfection.—Very useful indoors.

T. Majestic.—Splendid size.

TOMATOES: POTATO BLIGHT ON.—See *POTATO BLIGHT.*

TOMMASINIA.—Now included in the genus *PEUCEDANUM.*

TOMTATO.

This is obtained by grafting tomatoes on potatoes. It bears tomatoes on its branches and potatoes at its roots, and is sometimes offered as a novelty in horticultural papers by nursery firms to unwary amateurs. Its practical value at present is *nil*, since tomatoes and potatoes of far better quality can be obtained by growing separate plants, and, candidly, we cannot commend this freak to readers at present.

TONGUE GRAFTING.—See under GRAFTING in *PROPAGATION OF PLANTS.*

TONK'S MANURE.

This is a most useful fertiliser for roses, regarded by some growers as indispensable to success. The formula has been published in many works, and our Dictionary would be incomplete without it, as although every experienced rose-grower knows how to make it, the majority of amateurs do not. The formula is :—

Sulphate of Iron . . .	1 lb.
Sulphate of Magnesia . .	2 lb.
Sulphate of Lime . . .	8 lb.
Kainit[1]	10 lb.
Superphosphate . . .	12 lb.

A quarter of a pound of the mixture after each ingredient has been thoroughly incorporated with the rest is forked into each square yard of rose bed in the late winter, or in the spring after completing the pruning. It may also be used in the autumn or winter for the preparation of the borders at the rate of 12–16 oz. per cubic yard of soil.

TOOL HOUSE or SHED.—This is now no longer distinct from the *POTTING SHED*, on which we give a separate article.

TOOLS.—See *GARDEN TOOLS.*

TOOLS FOR PRUNING.—See *PRUNING ROSES AND SHRUBS.*

TOOTH CRESS (*Cardamine diphylla*). See *CARDAMINE.*

TOP-DRESSING.

The difference between a top-dressing and a mulch is quite a simple one. A top-dressing is put on for the purpose of increasing the richness of the soil below it, and also for the purpose of feeding the plants. A mulch is put on simply to conserve the soil's moisture, without any idea of feeding the plants.

Top-dressings, then, being used for a definite feeding purpose should be as rich as possible, but, of course, it is advisable to study the requirements of one's plants before applying them. Mild material such as very old hotbed manure, useful both for top-dressing and mulching, can never do any harm, but on the other hand certain non-ericaceous plants might be quickly killed by a heavy top-dressing of peat, it being a case of one plant's food being another plant's poison.

---

[1] Half a stone of Sulphate of Potash may be substituted for the Kainit at desire, but the material is then more suitable for spring application than for winter use.—EDITOR.

Top-dressing Materials.—If, then, we keep in view the definite purpose of top-dressings, we find that there is a wide range of materials which are highly suitable, many more indeed than for mulching. For the less robust plants we have old hotbed manure, year-old lawn mowings, and year-old vegetable refuse for use as top-dressings. For stronger subjects we have eight-weeks-old farmyard manure, six-months-old cow-dung, year-old pig manure, year-old leaf-mould, fortnight-old grass mowings, year-old weathered sewage sludge, and many other materials. For ericaceous plants such as Heaths and Rhododendrons, we have peat for use as top-dressings. This is usually mixed in varying proportions with stable or farmyard manure.

The above may usually be considered suitable for spring and summer top-dressing, and fertilisers may also be used for this purpose, as will be described in a paragraph later on. For autumn top-dressing, however, much less rich materials are usually applied, such as half-rotted leaves, very strawy stable dung, or even cocoanut fibre refuse. The object of this form of top-dressing is generally different from the above, with the exception of peat for the Rhododendrons and Heaths. It is used, as a rule, to keep the various subjects warm and freer from moisture during the winter. It acts, indeed, as a kind of autumn or winter mulch.

Useful Top-dressings.—The following will be found useful mixtures for the varying purposes named :—

For Choice Flower Borders.—These require a mild top-dressing, and we recommend the following mixture :—

Old Hotbed Manure	2 parts.
Leaf-mould	1 part.

The material should be well mixed and applied with a fork in a layer about 1–2 ins. thick.

For Lawns.—Lawns often get bare by constant use, especially if games are played on them. The bare spots should be well raked with a sharp iron-toothed rake, and one or other of the following top-dressings applied. Grass seed should then be sown on the surface, well rolled in, and birds kept off by means of cotton. The first mixture is :—

Old Hotbed Manure	6 parts.
Rich Turfy Loam	6 parts.
Leaf-mould	3 parts.
Wood Ashes	1 part.
Silver Sand	1 part.

A cheaper mixture is made as follows :—

Rotted Vegetable Refuse	6 parts.
Turfy Loam	3 parts.
Sand	1 part.

Where moss is troublesome on lawns this should be thoroughly raked off first, and the patch dusted well with quicklime. Either of the above top-dressings may then be used before seed is sown.

For Pot Plants.—Top-dressings are indispensable in the culture of certain pot plants, such as Tomatoes and other gross-feeding subjects which are strong growers. It is somewhat difficult to recommend here any one or two mixtures as being the best, since much depends on the condition of the various subjects up to the time of application. However, the mixture below will be satisfactory for strong growers :—

Turfy Loam	8 parts.
Month-old Dung	6 parts.
Bonemeal	1 part.
Wood Ashes and Charcoal	1 part.
Proprietary Fertiliser	A dash.

For less robust pot plants it will be found that the above is too strong. The mixture below is recommended for these :—

Old Hotbed Manure	1 part.
Leaf-mould	4 parts.
Turfy Loam	4 parts.
Fertiliser	A dash.

Top-dressings for most pot plants should be put on in two or three relays, each of which should be rather less than 1 in. thick.

For Rhododendrons. — These and Heath-like plants will appreciate a top-dressing of the following mixture —:

Good Peat	6 parts.
Old Hotbed Manure	3 parts.
Leaf-mould	1½ parts.

A good thick layer of this will serve both as a mulch and as food for the plants, especially if much water is poured through it in dry summer weather.

For Rock Plants. — Varying top-dressings are recommended for these by different authorities. The following, however, is quite a useful mixture :—

Old Hotbed Manure	4 parts.
Leaf-mould	4 parts.
Sharp Sand or Grit	1 part.

This can be applied in the spring or autumn, and put round the plants, care being taken not to allow any to reach their centres.

For peat-loving rock plants it is advisable to use the following or a similar mixture :—

Old Hotbed Manure	2 parts.
Good Peat	4 parts.
Leaf-mould	2 parts.
Sand or Grit	1 part.

The sand may be increased for subjects which like a very light medium, and the mixture should be applied in the same way as the previous one.

For Roses.—See under Manure Top-dressings below. Tonk's Fertiliser, a good manure any one can make, can also be used with great success. See article on *Tonk's Manure.*

For Shrub Borders.—Where Rhododendrons and other ericaceous shrubs are not grown, the following mixture forms a useful top-dressing for shrubberies :—

Rough Turfy Loam	2 parts.
Old Hotbed Manure	1 part.
Leaf-mould	1 part.

This can be dug in in the spring, autumn, or winter, but is best spread on the top in the spring.

For Vines.—See under Manure Top-dressings below.

Chip Top-dressings. — Quite a distinct form of top-dressing is that known as the chip top-dressing, and it is highly useful for rock plants and moraine subjects. Varying proportions of limestone, granite, or other chips, and sand are recommended by rock garden experts, but a mixture of 1 part sand to 4 parts of chips seems about right. This is scattered freely over the surface of the garden or moraine, and is distinctly useful for securing porosity of the soil and at the same time preventing evaporation being unduly rapid. It should be remembered when using these chip top-dressings that certain plants like a top-dressing containing lime chips, but that certain other plants will not grow in soil which contains lime chips, or is top-dressed with them. Some of the more important of these lime-hating plants are mentioned in our article on *Lime-Haters.* The majority of rock plants, however, thrive in or near limestone soils.

Fertiliser Top-dressings. — A further class of top-dressings is found in those in which proprietary fertilisers form a part, and, of course, the compositiom of these top-dressings may vary very widely. It is difficult to advise the proportions of old hotbed manure, leaf-mould, and fertiliser to use, as most gardeners have their own pet mixture, but a good general top-dressing suitable for late winter or early spring use may be made up as follows :—

Old Hotbed Manure . . .	12 parts.
Leaf-mould	12 parts.
Riddled Wood Ashes . .	3 parts.
Old Soot	2 parts.
Bonemeal	1 part.
Proprietary Fertiliser . .	2 parts.

Proprietary fertilisers which consist largely of coal ashes or other similar useless material should not be used, but materials rich in true plant food will give satisfactory returns if used as top-dressings. A far richer material than the above is made as follows :—

Sand or Fine Soil . . .	4 parts.
Proprietary Fertiliser . .	1 part.

This can be lightly scattered over the surface and either hoed or watered in.

Single fertilisers are often used as top-dressings; for instance, Sulphate of Ammonia, Salt, Nitrate of Soda, and Superphosphate. These are all lightly scattered on the surface in the spring or early summer and either hoed or watered in. The proportions are given and the general uses of these fertilisers are described in other articles.

Certain other single fertilisers are useful for top-dressings in the autumn, notably Bonemeal, Kainit, Ground Bones, and others. The use of these is fully described elsewhere.

Manure Top-dressings. — For certain subjects, notably Vines, Roses, Peaches, Fruit Trees, and Asparagus, an annual top-dressing of dung is more or less essential. This dung as a rule should be moderately fresh, and about a fortnight old if it has been well made and not allowed to become dry or mildewed. On light soils cow manure is preferable to stable or farmyard manure, but in any case this should not be used fresher than twenty-eight days from its production, otherwise it will be too watery, and for indoor work the cow dung should first be dried on a tray over the greenhouse boiler and then thoroughly moistened with boiling water in order to kill the numerous soil pests. Out of doors this is not usually considered necessary, but if it swarms with grubs as cow-dung often does, a soil fumigant should be scattered on the ground before the top-dressing is spread. As a general rule these top-dressings are applied in the autumn, though some of us think they would do more good if put on in the spring. Bonemeal may be scattered on the ground immediately before applying the manure. A layer about 2–3 ins. thick makes a very ample top-dressing.

What Not to Use. — Certain materials are distinctly objectionable for use as top-dressings, and of these the most notable is road scrapings. Pond mud and drain mud, of course, are quite unsuitable, and the same remark applies to leaf-mould made from such materials as poplar and walnut leaves, which is a strongly acid pulp. Generally speaking, the materials described as being objectionable for mulching are also objectionable for top-dressing, though this does not apply to fertilisers or to such materials as sewage sludge, which last if reasonably weathered is one of the richest and best of all top-dressings. The remarks under preparations for mulching apply equally to top-dressing, since but little value will be obtained if top-dressings are applied to impenetrable soils.

Mixing Top-dressings.—Just a word in conclusion on the important matter of mixing top-dressings. The material should for most purposes be applied in a fine state, though comparatively coarse material may be used for top-dressing choice flower or herbaceous borders and also for shrubberies. In the mixing of such materials as manure, vegetable refuse, and leaf-mould, it is best to start first with the drier material and gradually rub in that which is more sticky. This, however, does not apply to powdery materials such as wood ashes and proprietary fertilisers, which should be mixed first of all with the next drier material. Thus, for instance, in the lawn dressing described above a start should be made with the loam. Into this is rubbed the leaf-soil, then the old hotbed manure is rubbed into that mixture, and finally, the two dry materials, having first been mixed together in a separate heap, are gradually incorporated with the heap containing the leaf-mould, loam, and manure. Two or three turnings of the top-dressing heap will be necessary to ensure even mixing, after which the material, if it is not to be used for the coarser purposes described above, should be rubbed through a ½-inch sieve. Some top-dressings, of course, will keep indefinitely, but those containing proprietary fertilisers soon deteriorate, and are best made fresh as required for use.—E. T. E.

TOP-DRESSING AND MULCHING OF FRUIT.—See *FRUIT CULTURE, HARDY: GENERAL CONSIDERATIONS.*

TOPIARY WORK.

The choosing of a site, and the landscape work in connection with the laying out of a Formal or Topiary Garden is a matter of some importance, and where possible the portion of the garden containing the clipped trees should be surrounded on one side at least by a terrace or other high ground, for nowhere is the work seen to such an advantage as when viewed from some point above the level of the trees.

If possible the terrace or high ground should be provided on the north side of the garden, but on no account should sun and light be excluded. The varieties of trees that adapt themselves to Topiary Work are few, and these revel in the full amount of sunshine. Thus every care should be taken to avoid shade of any kind, but at the same time shelter must be provided, for it is of almost as much importance as sun. The shrubs for the purpose include Holly, Yew, and Box; the two latter in preference to the former, since Holly is apt soon to become scraggy.

No Formal or Topiary Garden is quite complete without a well-clipped hedge or two, and some of these at least should be planted with Beech or Hornbeam, though the former should only be used for hedges, as it has a warm appearance in winter, and the beautiful green of the spring foliage harmonises with the darker green of the Yew and Box. Both the last are surface-rooting shrubs; therefore, beyond trenching the ground to a depth of about 2½ ft., soil preparation need not be seriously considered, since after attention in the way of top-dressings can be resorted to. But if the soil is of a deep rich nature containing lime or chalk, so much the better. The Yew is a gross feeding plant and quickly exhausts the soil. Therefore, as the trees grow, rich top-dressings must be applied to the surface to keep the growth healthy and vigorous. When the planting is being done, on no account overcrowd the trees, or in after years the garden will give a stiff and heavy impression to the eye, which should be carefully avoided. No clipping or training of the trees should be resorted to until they reach a fair size, say about 5 ft. in height.

The variety of shapes into which Yew and Box can be trained are too numerous to mention here. Therefore every individual plant should be carefully considered and trained according to individual taste and to whatever shape the tree lends itself most. The Yew in particular is an easy subject to handle. Time and patience will achieve almost any desired animal, bird, letter, or shape.

Perhaps the most important period in a Formal or Topiary Garden is the clipping season, for during that period the utmost care and attention must be bestowed on each tree or hedge, and only skilled workmen employed. Not a single branch or twig should be out of place when the work is finished.

The Yew when left by itself is always a dull and sombre plant, and thus nothing should be left undone to make the garden bright and pleasing by the free use of brilliant flowering plants.

Foliage or flowering plants which under different circumstances would be considered beautiful objects are very little use among Yews. Whatever flowers are used in the Topiary Garden, nature should be allowed as far as practicable to have full sway with them. No stiff or formal bedding schemes are permissible here; among sculptured trees man is always striving against nature —never an easy adversary to fight.

Topiary Work although greatly neglected, and in many cases largely despised, has a future before it; of that we are certain, so long as the art is kept within reasonable limits and not foolishly overdone. By many modern gardeners it is always referred to as a monument of perverted taste, but we hope that this obviously unjust appellation may soon be withdrawn.—W. G.

TORAIA (*Ilex latifolia*).—See *HOLLY*.

TORCH LILY.—See *KNIPHOFIA*.

TORCH PINE (*Pinus Taeda*).—See *TREES*.

TORENIA.—See *ANNUALS, HALF-HARDY: LIST OF*.

TORMENTIL (*Potentilla Tormentilla*). See footnote to article on *POTENTILLA*.

TORMENTILLA.—Now included in the genus *POTENTILLA*.

TORREYA.—For the best species see *TREES*.

TORTRICIDÆ.—See ROSE GRUBS in *INSECT PESTS*.

TORTRIX.—See under ROSE GRUBS in *INSECT PESTS*.

TOWN AND CITY GARDENING.

In speaking of the possibilities of the town and city garden, it must be distinctly understood that reference is here made to populous and congested areas and where the whir of machinery is heard. It is a difficult matter to deal with town or city gardening without distinguishing between areas such as Bermondsey, Clapham, Highgate, Shoreditch (in London), and cities such as Exeter and Sheffield. What would thrive in Highgate and Exeter would fail utterly in Shoreditch and Sheffield. So we come to the conclusion that success or failure will be mainly regulated and governed —given, of course, intelligent culture—by the number of dwelling-houses and factories in the district. We must impress owners of town and city gardens, however, that it is quite possible to convert them into things of beauty, and then such gardens will add to the amenities of city life very appreciably.

It is true that much has been done in this direction during the past decade, but much remains to be done, that verdure, colour, and beauty may replace miscellaneous rubbish and rank weeds. After thirty years in the most congested parts of London, coupled with the inspection of thousands of town and city gardens, the writer feels that the most serious obstacle to success is the tendency to plant subjects that appeal to the cultivator, with total disregard to their suitability for the purpose. This, of course, soon spells disappointment in cities. Attention should be concentrated on plants that have clearly demonstrated their suitability and that can be relied upon to give a good account of themselves, not simply for a single season, but to increase in size and beauty year by year.

Happily the number of available subjects in trees, shrubs, and flowering plants is by no means small, as we shall show. Also a good number of town and city gardens are fairly spacious in character. We will now give some notes on the more important points in the subject.

Soil and Site.—Let us start with a word as to what by courtesy we will term soil in town and city gardens. Builders' refuse plays an important part in this, and where the top-spit and subsoil are of a clayey nature the bricks and stones only should be removed, leaving the lime rubble, etc., to improve the texture of the ground. On the other hand, where the soil is porous and coal ashes have been added, it is useless to plant until a layer of clay has been buried 2 ft. deep and a layer spread on the surface to become pulverized through exposure to frost. This should be supplemented by a heavy dressing of stable manure, and then splendid results are certain. Both clay and manure can usually be had free of cost from "the powers that be." In the absence of builders' rubble and where clay predominates, a liberal dressing of road sweepings, combined with early digging, will do all that is required. If a little new soil can be added from time to time (and this can often be had gratis during the excavations for buildings in adjacent areas), so much the better.

The site will govern to a great extent the subjects employed. Where King Sol is excluded for the greater part of the day, trees, shrubs, and ferns must predominate. The importance of overhead waterings must be emphasised, and it must be remembered that apart from dirt deposits, smoke, etc., the atmospheric moisture is infinitely less in congested areas than in the country. From late spring to early autumn, except when heavy rain is frequent, ply the hose overhead both morning and evening. Not less important is to avoid overcrowding. Err on the side of sparsity, and humour the plants by an approved artificial fertiliser throughout the growing season.

The Lawn.—What about the grass plot or lawn? A perfect sward can be had, provided the right kinds of grasses are used. For this purpose there is nothing to equal *Poa annua* and *P. nemoralis.* Like the poor, the first named is always with us, and we meet it everywhere; by the roadside, in every garden, and on every patch of waste land. The fact of the seeds of this species maturing in gradual fashion accounts for its prohibitive price; and readers are advised to sow seed of *P. nemoralis,* and to lift plants of *P. annua* from anywhere and reset them 18 ins. apart in the lawn. In preparing the ground dig in some animal manure, level, and roll if possible. Then dress with sulphate of ammonia in spring, and with soot and lime in autumn. Bluff the lusty sparrow by a network of black cotton and give abundance of water in dry weather. In this way is secured that delightful feeling of elasticity which is identified with a perfect sward.

Trees and Climbers.—Speaking of trees, careful judgment must be used in their arrangement and disposition, otherwise the whole garden will be robbed of air, light, and sun. Other than in big gardens trees of large growth such as the Plane, Poplar, and Elm are not to be recommended. On the other hand, the Lombardy Poplar (plant in a cavity and deluge with water), the common Laburnum, the double-flowered Cherry (*Cerasus Pseudo-cerasus*), and the Almond (*Amygdalus communis*) are especially valuable, since they blossom with the same freedom as in the country. The Hawthorns (*Crataegus*) behave splendidly if the branches are thinned every alternate year, whilst *Cotoneaster frigida* gives us a fine crop of berries which do much to brighten the garden in winter. Eminently satisfactory are the Tree of Heaven (*Ailanthus glandulosa, Catalpa bignonioides aurea*, and *Paulownia imperialis*. The False Acacia (*Robinia Pseudacacia*), the Lady of the Woods, or Silver Birch (*Betula alba*), and the Mulberry are quite at home; these must find a place on account of their historic associations and character. In addition to these we have the purple-leaved Beech (*Fagus sylvatica purpurea*) and the Service Tree (*Pyrus Sorbus*).

The Lime and Sycamore should be left strictly alone on account of the leaves assuming a rusty appearance in early summer. As a shade tree, plant 12 ft. high standards of either the Weeping Elm (*Ulmus campestris pendula*) or the Weeping Ash (*Fraxinus excelsior pendula*).

The Lombardy Poplar (*Populus fastigiata*) also the Laburnum form capital arches in city gardens. The first named requires no support whatever. Plant in April 10 ft. high trees in pairs, bend over the tops and tie securely with soft string so as to form a stately arch, and within two months you will have a perfect article. *Polygonum baldschuanicum*, the Traveller's Joy (*Clematis Vitalba*), *Clematis Jackmani, Jasminum officinale, Lycium barbarum*, and the rampant *Ampelopsis quinquefolia* are all adapted for covering wire, or preferably artistic wood arches, fences, etc.

Shrubs.—What shall we say about shrubs? If the garden is a sun-bathed one, plant them sparingly, if a quantity of flowers are required. *Olearia Haastii* is invaluable, and, apart from its silvery grey leafage, it literally clothes itself with white flowers in its season. *Yucca gloriosa* and *Y. recurvifolia*, the Persian and common Lilac (*Syringa*), the Guelder Rose (*Viburnum Opulus*), *Weigela* (*Diervilla*) *amabilis Eva Rathke*,—encourage the basal growths and remove a portion of the flowered stems of last-named annually, —*Hypericum moserianum* and *H. elatum*, the Bladder Senna (*Colutea arborescens*), the Mock Orange (*Philadelphus coronarius*), the Common, Oval-leaved and Golden-leaved Privets (*Ligustrum*), the Broad-leaved Holly (*Ilex Hodginsii*) and Broad-leaved Box (*Buxus Handsworthii*), *Aucuba japonica, Euonymus europaeus*,—the last named must be clipped twice annually in May and mid-August,—*Hibiscus syriacus, Cornus aurea Spathi* and *C. sibirica*, the Gold and Silver Elders (*Sambucus argentea variegata* and *S. aurea*), *Dimorphanthus mandschuricus variegata* (Syn. *Aralia*), together with the

Flowering Currant (*Ribes sanguineum*), the Spanish Broom (*Spartium junceum*), the Venetian Sumach (*Rhus Cotinus*), and *Prunus Pissardi*, are all amenable to city life. Bring together a dozen plants of Golden Privet (*Ligustrum aureum*) and *Prunus Pissardi* to furnish a striking bit of colouring, but exclude the ornamental Bamboos as they are not adapted for our purpose.

Hardy Flowers.—The fact that the majority of hardy perennials do well should do much to bring about sustained interest and enthusiasm on the part of the city dweller, and although we cannot attempt the 12 ft. wide borders and very spacious effects, it is possible in many instances to arrange a 6 ft. wide colony on the sunny side of the garden.

As a background plant *Bocconia cordata, Campanula pyramidalis* in blue and white, *Doronicum Harpur Crewe, Eupatorium purpureum*, the Golden Rod (*Solidago Golden Wings*), *Helenium autumnale* and *superbum*, with the tall *Helianthus rigidus Miss Mellish*, and *H. maximus Rev. C. Wolley Dod;* Hollyhocks (*Althaea rosea*); Lupines; the tall Michaelmas Daisies (*Aster cordifolius, ericoides, Novi Belgii*, etc.); the tall perennial Larkspurs (*Delphiniums*), — with these remove the spikes as soon as their beauty is past, top-dress, and then a second crop will be promptly produced, — *Rudbeckia laciniata fl. pl.* with its sheaves of golden blossoms, and *Tritoma uvaria.*

In the central part arrange *Achillea Ptarmica The Pearl, Chrysanthemum maximum King Edward VII*, and *H. G. Moon; Coreopsis grandiflora;* Day Lilies (*Hemerocallis flava* and *H. aurantiaca major*); *Gaillardia grandiflora; Heleniums Bolanderi* and *Riverton Gem; Helianthus multiflorus Bouquet d'Or; Heliopsis scabra B. Ladhams; Œnothera fruticosa major* and *Œ. Youngi; Phlox*—any white kinds as the coloured varieties are a failure; *Scabiosa caucasica; Senecio clivorum, Sidalcea candida* and *Listeri, Statice latifolia, Stenactis speciosa*, the Sweet Bergamot (*Monarda didyma*); and *Tritoma nobilis.*

We have plenty of material for the foreground. All the Pyrethrums are a success. If given plenty of water and top-dressing after flowering they will throw up a first-rate second crop of bloom. Carnations, too, do well, and especially so the perpetual-flowering variety *Britannia.* Keep sparrows from them with black cotton or fruit-netting, and plant on slightly raised ground. In the case of border varieties, layer as early in the season as possible. Other foreground plants include: Aquilegias; Alpine Auriculas; *Campanula turbinata hybrida;* Double Daisies; *Genista pilosa;* the glorious *Geum Mrs Bradshaw;* Irises in variety; *Helenium cupreum* and *H. Hoopesii; Heuchera hybrida* and *H. sanguinea; Iberis gibraltarica;* dwarf Michaelmas Daisies (such as *Aster acris, Amellus bessarabicus, dumosus, ericoides, Ezma*, and *Gorgeous*); *Œnothera macrocarpa;* Pansies; Pinks (*Her Majesty* and *Mrs Sinkins*); *Potentilla Miss Willmott; Rudbeckia Newmani* (Syn. *speciosa*); *Sedum spectabile;* Snapdragons (*Antirrhinum majus*); *Statice incana; Thalictrum adiantifolium; Tradescantia virginiana* in variety, and Violas as an edging.

We can also enjoy the beauty and fragrance of Polyanthus and Wallflowers by planting imported plants in April, watering overhead twice daily until established.

Annuals.—Touching upon annuals, the majority are short lived.

Sweet Peas cannot be expected to attain a height in excess of 3 ft. *Calliopsis tinctoria atrosanguinea,* Clarkias, Godetias, Marigolds (both African and French), Mignonette, dwarf and climbing Nasturtiums—(*Queen of the Tom Thumbs,* with foliage of silvery variegation, is a splendid edging subject for city gardens)—the Night-scented Stock (*Matthiola bicornis*), *Phlox Drummondii,* Shirley Poppies, sweet-scented Tobacco (*Nicotiana affinis*), Sweet Alyssum, and Ten-week Stocks are the most desirable.

Sow thinly in April, thin when quite young, and grow between a few early Chrysanthemums and Dahlias to take their place later. All the early flowering varieties of the first-named flower, also the October varieties, are to be recommended. For Dahlias see the notes farther on in this article.

Bulbous Plants.—A lady connected with Royalty visited a public garden not a thousand miles from the Tower Bridge in the spring of 1913, and declared that the display was superior to that at Hampton Court, which comment should be sufficient evidence that spring - flowering bulbous plants are a success in city gardens. It should be explained, however, that in common with every other family of plants, a considerable number fail to thrive or blossom satisfactorily. With regard to Hyacinths, leave the double-flowered kinds strictly alone. The single kinds as a whole do well, but it is advisable to avoid delicate shades and pure white varieties. Especially fine are: *Charles Dickens, Czar Peter, Gertrude, King of the Blues, King of the Yellows, Norma,* and *Robert Steiger.*

Among single Tulips, plant *Bacchus, Cottage Maid, Duchesse de Parma, Joost Von Vondel, Keizer's Kroon, Proserpine, Thomas Moore,* and *White Vondel.*

Tulips (Double).—Of these plant *Blanche Hative, Gloria Solis, La Candeur, Vuaarbaak,* and *Yellow Tournesol.*

Charming effects are produced by planting these tulips thinly and arranging wallflowers in modern kinds, also the Bunch Polyanthus between them. Splendid too are the Darwin Tulips, and in each case the foliage should be allowed to mature before the bulbs are lifted. In this way fair results are obtained the second season, though deterioration is very rapid in city gardens.

The above remarks apply to bulbous plants generally, and what treasures we have in the more robust amongst Narcissi, such as *Emperor, Empress, Horsfieldi, Princeps, Sir Watkin,* whilst the *Phoenix* varieties are a huge success. A point of importance is to defer planting till mid-November, as we do not want the growths above ground in winter to be crippled by exposure for months to fogs and smoke.

Few bulbous plants lend themselves to naturalisation, but the Bluebell of our woodlands (*Scilla nutans*), Chionodoxas, Crocuses, flowering Snowflakes (*Leucojum vernum*), and *Scilla sibirica* all settle down to city life with a good grace. They are quite worthy of a place in a portion of the lawn (planted 4 ins. deep), but we must leave the grass strictly alone till the end of June. Gladioli bloom well for a season only, but even under the most liberal treatment the new corms seldom attain to flowering dimensions. The same applies to *Hyacinthus candicans,* the majority of Liliums, the Snowdrop, and the Spanish Iris. The Tiger Lily (*Lilium tigrinum*) and its variety *splendens, L. candidum,* and *L. testaceum,* however, resolve themselves into permanent colonies. Such popular species as *Lilium album, auratum, lancifolium, roseum,* and *rubrum* behave splendidly for a season, and sometimes for two years. It is important that, with the exception of the Madonna Lily (*L. candidum*), the stems be covered to a depth of 6 ins. with either soil or manure, and this should be done when the plants are about 1 ft. high.

Dahlias.—Regarding these we may say they are *par excellence* for town and city gardens, with the exception of the single-flowered kinds, which never bloom profusely. If the side or lateral growths are removed in the case of Paeony-flowered and Cactus sections, a glorious display will be assured.

Do not arrange the plants in partially shaded positions, or in proximity to trees, or shrubs of large growth. Moisten the plants overhead in the late evening; this will act in a dual capacity, encouraging rapid growth and also doing much to keep that nocturnal pest the earwig at bay. It is superfluous to say that garden varieties—that is, free-flowering sorts which throw their flowers well above the foliage—must be selected. A short list of the very finest for our present purpose may be given :—

CACTUS.—Britannia, Duchess of Marlborough, Edith Carter, Florodora, Hon. Mrs Greville, Lustre, Mary Purrier, Mrs Douglas Fleming, Mrs Forrester Paton, Mrs Landale, Sportsman, Star, Sweetbriar, Thomas Parkin, and Victory.

COLLERETTE. — Diadem, Henry Farman, Maurice Rivoire, and Negro.

DECORATIVE.—Brentwood Yellow, Jeanne Charmet, Kaiserin Augusta Victoria, Market Yellow, and Souvenir de Gustave Doujon.

PAEONY - FLOWERED. — Colonel Cody, Geisha, Liberty, Pantaloon, Paul Kruger, Reynolds, Salome, and Queen Wilhelmina.

POMPON. — Admiration, Annie Holton, Bacchus, Douglas, Emily Hopper, Irene, Tommy Keith, and Virginia.

Bedding Plants.—Among summer bedding plants for city gardens, the following are excellent :—

FUCHSIAS.—Ballet Girl, Charming, Earl of Beaconsfield, Lyle's-Own, Mrs Marshall, and Rose of Castille. These are all perfectly happy in the open sunshine, in fact they fail to give a good account of themselves in shady spots.

ZONAL PELARGONIUMS. — Crystal Palace Gem, Flower of Spring, Henri Jacoby, Mrs Levers, Paul Crampel, and Queen of Whites. *Ivy-leaved Pelargoniums* :—Galilee and Madame Crousse are far and away the best for our purpose.

Then we have Calceolarias (bronze and yellow varieties), Cannas, Celsias (if planted when plumes are showing), *Eulalia zebrina, Heliotropium President Garfield,* Kochias, Lantanas, and Marguerites, whilst *Centaurea candidissima, Cineraria maritima, Dactylis glomerata elegantissima,* and *Koniga maritima* form capital edging plants.

Roses.—Mention must be made of a few Roses which defy the unfavourable conditions of town and city life, and it should encourage the city dweller to know that in the unfavourable season of 1918, roses established in a garden five minutes' walk from the City of London made 8 ft. of growth as large as a man's small finger. The varieties to plant are :—*Albéric Barbier, Dorothy Perkins, Gruss an Teplitz, John Hopper, Margaret Dickson, Pride of Waltham,* and

Ulrich Brunner, as well as the old Cabbage Rose, crested Provence and *Rosa rugosa* varieties.

Afford very liberal treatment, giving a bushel of loam and manure to each plant. Dress frequently with an approved artificial stimulant, and prune severely each season. In addition to daily overhead waterings, apply abundance of water to the roots, giving liquid manure at least once a week from spring onwards. To combat the attacks of aphis use petroleum emulsion.

Fountains and Water Gardens.—It is rare indeed that one comes across anything in the shape of a water garden in city gardens, but at the same time fountains with spacious basins are often seen. *Acorus Calamus*, *Alisma Plantago*, Callas in summer, *Caltha palustris fl. pl.*, and *Acorus pseudo-acorus* will thrive therein.

Plants for Shady Corners.—In a shady corner arrange a varied bed for ferns and other shade-loving plants. In the background plant *Ailanthus glandulosa* and *Paulownia imperialis*—cut both down to the ground level each winter—also the False Acacia, *Colutea arborescens*; then a plant or two of *Aucuba japonica* and *Euonymus europaeus* may well come in, filling in with Funkias in variety, more especially *F. albo-marginata* and *subcordata*; Lily of the Valley; *Megasea cordifolia* and Solomon's Seal. Of ferns, choose the Hartstongues (*Scolopendrium vulgare*), the Lady Fern (*Athyrium Filix-fœmina*), and the Male Fern (*Lastrea Filix-mas*). Many other kinds are a partial success; but it is painful to see a plant struggling for existence, and therefore only those that really thrive should be grown. In May plant half a dozen Variegated Maize (*Zea gracillima variegata*) here and there, which will do much to enhance the beauty of the whole. Plant and peg down a few ivy plants in front of the whole to form a foot-wide belt.

Wall Plants.—In speaking of the clothing of house walls, it may be said that the meanest building is redeemed from mediocrity by the presence of florescence and verdure. It is equally true that it is a huge mistake to hide the detailed portions of buildings that possess architectural features of merit, and here subjects that are amenable to drastic pruning should be employed. For the walls facing north and east *Ampelopsis quinquefolia*, *A. Veitchii*, and *Hedera Hederacea*, as also *Lycium barbarum*, will give a good account of themselves. It is necessary, however, to support the ivy by nailing, as it seldom clings to the walls in congested areas. For the walls facing south and west we have *Clematis Jackmani*, the Passion Flower (*Passiflora coerulea*), *Polygonum baldschuanicum*, the Traveller's Joy (*Clematis Vitalba*), whilst *Jasminum officinale* is perfectly happy, and flings its delicious fragrance far and wide over many weeks in early summer.

Vegetable Culture.—It may be pointed out that it is quite possible to produce first-rate vegetable crops in city gardens, and with the exception of Runner Beans, which fail to fertilise, and drop 90 per cent. of their flowers in the bud state, both vegetables and salads grow apace and give good returns for the labour and time devoted to them. We have to bear in mind, however, that the cultural details are in some respects quite different from those which obtain in the country, and where the air is pure and free from chemical impurities. It is idle to plant cabbages in October in the usual way, as the combination of smoke and fogs will destroy them.

Imported plants have to be set in March. Again, to sow Lettuces and Onions in autumn with a view to a stock of plants for spring planting, spells wasted efforts and seeds. Further, it is mere waste of time, labour, and money to plant Broccoli and Cauliflowers which mature naturally during the winter and early spring (purple Broccoli included). Such plants never survive, or at any rate become consumptive wrecks, and are relegated to the rubbish heap. A very safe, and indeed the only advisable programme, is to confine your operations to crops which mature from spring to the end of November. Onions are essentially pure-air plants, but it has been clearly demonstrated in the most congested parts of London, that onion sets planted in ground rich in potash are capable of producing first-rate bulbs.

With regard to Potatoes, there is nothing to equal the variety *Midlothian* for our purpose; whilst the maincrop kinds are not worth attention in city gardens. In dealing with Turnips, sow for an early crop only, unless it is desired to have a supply of tops to serve as a wholesome vegetable. The Garden Swede, however, is a great success, and the same applies to the coarser Mangold Wurzels. Splendid roots have been produced during the past three years on allotments within five minutes' walk of the square mile known as London City, and it is superfluous to say they form capital food for rabbits during the winter months. French Beans, both dwarf and climbing, are a big success, and the same applies to Broad Beans.

Pests.—In view of the fact that aphis is vastly more troublesome in city gardens than in the country, and on the principle that prevention is better than cure, it occurred to the present writer two years ago to experiment with spraying the plants twice weekly, dating from the time they reached 6 ins. in height, and until they attained the required size. Result, the plants were maintained in a perfectly clean condition throughout. A good insecticide should be employed, applied by means of a fine-rosed can. Lastly, we may point out that both Celery and Leeks behave splendidly, and being covered with soil in winter, are not affected by smoke and fogs.

W. H. A.

[It should be noted that the names of the various subjects mentioned in the above article are those by which they are commonly known by gardeners, and do not necessarily correspond with the newer nomenclature of Kew.—EDITOR.]

TRACHELIUM (THROAT-WORT, Nat. Ord. Campanulaceæ).—Only two Tracheliums are at all generally grown. These, *T. caeruleum* (Syn. *T. azureum*), often known as the BLUE THROAT-WORT, and *T. rumelianum* (Syn. *T. rumelicum*), are hardy herbaceous perennials bearing blue flowers from July to August, and averaging 1–2 ft. in height. A useful white form of the first is also available. They succeed under ordinary border cultivation as described in our article on *PERENNIALS: GENERAL CULTURE OF*, and may be propagated by seeds, cuttings, and root division at the usual times. Planting is best postponed until mid-March in very exposed districts, as under such conditions they lack absolute hardiness.

TRACHYCARPUS.—For the best species see *PALMS*.

TRADESCANTIA (SPIDER-WORT, Nat. Ord. Commelinaceæ).—This is a genus of pretty ornamental greenhouse foliage plants, suitable for hanging baskets, and hardy herbaceous perennials, suitable for the flower borders. The first section is increased by cuttings or divisions in spring. The soil should be good, rich, fibrous loam, with a little peat and sand, and it should be well drained. Temperature required, 50–55° F.

Greenhouse Species. — *Tradescantia discolor.* — White - pink. Flowers in July. Height, 1–1½ ft.

T. paniculata. — Pink shade. Flowers in August. Height, 1 ft.

T. Warscewicziana. — Purple. Flowers in May. Height, 1–2 ft.

T. Zebrina.—Purple. Flowers in July. Height, 1 ft.

Perennial Border Species.—These are not difficult to cultivate in ordinary light, rich soil in the usual way for hardy perennials. They are best propagated by root division in the spring, which is also the best planting time. We recommend the following :—

Tradescantia congesta.—This bears pretty blue flowers from July onwards, and averages about half a yard in height.

T. virginiana (Flower of a Day).—This is quite the most popular species, and five varieties of it are mentioned in the *Kew Hand-list of Herbaceous Plants.* The type is a pretty blue, but it may be had in red, purple, and white as well. All the forms bloom from July to August, and average 1–2½ ft. in height.

TRAGOPOGON (Nat. Ord. Compositæ).—This is an unimportant genus of hardy biennial plants succeeding with but little care in ordinary good garden soil in a sunny position, and chiefly propagated by seeds. *T. pratensis*, known as Goat's Beard, is sometimes grown in the borders, and bears yellow flowers from May to July, on plants 1½ ft. high. The best known species, however, is ***T. porrifolius***, the Salsafy of the kitchen garden, grass-like, and much grown for its delicious roots. The culture of this is described in our article on *Salsafy*, which see.

TRAILING AZALEA (***Loiseleuria decumbens***).—See *LOISELEURIA.*

TRAILING PLANTS.—See *CLIMBING AND TRAILING PLANTS.*

TRAINING CENTRES.—See Typical Training Centres in *WOMEN GARDENERS.*

TRAINING CLIMBERS.—See *CLIMBING AND TRAILING PLANTS.*

TRAINING OF GARDENERS.

With gardening as with other professions, there is no royal road to success ; those who would reach the summit must commence at the base and climb upwards. Gardening is essentially practical ; by theory alone no one can hope to become a successful gardener. At the same time, without a knowledge of the principles upon which horticulture is based, the gardener is likely to make many errors, or to be in doubt how to proceed when meeting with a new difficulty. There are, of course, thousands of skilful gardeners who have never devoted time to acquiring anything but practical experience ; but the day of empiricism is passing, and as time goes on it will be more than ever recognised that the best-equipped gardener is the one whose practice is fortified by knowledge, and who does not work by "rule of thumb." This has been recognised by the Royal Horticultural Society, which confers diplomas in horticulture, and, in conjunction with the University of London, grants degrees. Its examinations combine both theory and practice, and candidates are required to show that they have had a certain period of training as gardeners ; while at the Society's school at Wisley the curriculum embraces various branches of garden work, together with instruction on the scientific side, given by experts. All this, of course, is for those who aim to fill high positions ; those whose aspirations are lower may deem much of it unnecessary. There have been great gardeners who have had no scientific training, but they have been close students and observers, and have generally given much time to solving the problems before them.

As a rule, the youth who desires to adopt the profession of a gardener obtains an engagement at a private establishment, where he serves an apprenticeship of three years or more. He may perhaps start as "garden boy," and if he is industrious and intelligent he soon passes through the elementary stages. At the end of the apprenticeship he becomes a journeyman, and may either continue in the same employment, or migrate to another establishment, where his experiences will be different, but all tending to make him a finished gardener. At this time, too, if he be wise, he will seek to acquaint himself with the "why and wherefore" of some of the horticultural principles on which gardening is founded. Attached to most gardens of any pretensions is a "bothy," where he will be lodged.

Whether as apprentice or "boy," the first duties will be of a lowly and humdrum character, such as washing and crocking pots, mixing composts, and making himself generally useful. His subsequent training will include various operations connected with the cultivation of the land, such as digging and trenching; draining and making watercourses; the differences in soils, and how to prepare them for the needs of different crops; the making of seed beds; thinning out and transplanting; and hoeing and weeding.

In the matter of propagation there is the sowing of seedlings, with the conditions requisite to successful germination; pricking out, and potting on or planting out; and various sorts of cuttings and how to deal with them; increasing by layers and division; and the selection of suitable stocks for budding and grafting. Pruning, training, cutting back, disbudding, tying, and staking of trees, bushes, and plants of all sorts will also engage attention.

Under glass there will be the culture of Vines, Peaches, and other fruit, and of the innumerable flowering and foliage plants.

In vegetables there will be the requirements of the various crops, and their rotation, with the best varieties for local conditions.

Other matters will include the forcing of vegetables, fruits, and flowers, the management of the greenhouse, giving attention to ventilation, temperature, and watering; the uses of manures, "natural" and artificial; the packing of produce for transit by road and rail; the artistic arrangement of flowers in the conservatory and winter garden, and for indoor decoration; the planning of beds and borders and the laying out of a garden; and the recognition of insect and fungoid pests, and taking measures to prevent and eradicate them.

The foregoing is an outline of some of the things which the modern gardener should endeavour to master, and it is not to be supposed that all can be acquired in the brief space of an apprenticeship; indeed, the earnest gardener is always learning. It will be seen that in many things scientific study will help to make the task easier, and save much uncertainty and profitless labour. Among the subjects that can be thus learned are the physiological structures of all parts of plants, from the seed stage upwards, so that the individual characteristics of each, and their requirements, are understood; the processes of fertilisation and the methods of hybridising and cross-breeding, also the improvement of strains and varieties; the chemical composition of soil, and of fertilisers and manures; the causes that set up disease, and also the remedy. Then there is the classification of flowers, fruits, and vegetables, which often gives a clue to their cultural requirements. These and many other related subjects, though belonging to the theoretical side of gardening, are yet closely connected with practice, and are well worth the gardener's learning systematically. There is so much to learn that a lifetime is not long enough to learn it all; but every item learned adds to the gardener's usefulness and value, and increases his pleasure in his work.—W. J. C.

TRAINING OF PLANTS.

There are two reasons why plants under cultivation have to be trained: (1) Because we wish them to cover a certain space and look neat instead of straggling; and (2) to guide the energy of a plant into channels which will cause it to bear flowers and fruit, instead of allowing it to waste this energy on useless leaf and wood growth. There is not the slightest doubt that *judicious* arrangement by thinning of, say, a chrysanthemum, leads to the production of finer (though fewer) blooms. The subject of training plants is a large one, and is best considered in two sections: (1) Trees and Shrubs, and (2) Climbers.

Trees and Shrubs.—Fruit trees are *pruned* in autumn or winter, and *summer pinched* in July to induce the formation of fruit buds. If trained on walls or trellises due regard must be paid to the fact that branches must not be too close together, while they should cover all the available space evenly.

Of late years, flowering shrubs, such as the various varieties of Berberis, Philadelphus (MOCK ORANGE), Prunus, Syringa (LILAC), etc., have become popular. These are best thinned out in February or March; the work, however, must not be done too severely, and where flowers are borne only on the previous year's growth it is, of course, fatal to cut this away.

SHRUBS. — Such subjects as Aucubas and Euonymuses, as well as hollies and laurels, may also be trimmed into shape in spring. Box and yew are very suitable for the old-fashioned topiary work. They are trimmed in March with shears into the forms of cocks, dragons, etc., and form a fitting background to a herbaceous border.

Climbers.—It is with the climbing plants — or plants treated as climbers—that the true art of training is seen. If left to themselves,roses, wall-coverers such as ivy, Ampelopsis (VIRGINIAN CREEPER), Clematis, climbing vines (Vitis of sorts), greenhouse subjects such as Ipomoea, *Tropaeolum tuberosum*, Fortune's yellow rose, and the grape vine would become a mere tangle of growth. Hence they are usually trained to wires passed through eyeletted staples and strained by raidisseurs at the ends.

Materials for Training.—Bast is best for tying soft-wooded plants because it "gives" as growth increases. For harder-wooded plants, such as Roses and Escallonias, as well as climbers on walls, tarred string may be used. Shreds of old cloth 4 ins. long and 1½ ins. wide, used doubled, and held by special square wall nails, are preferable for brick walls. In no case must the stem be too tightly held. Even large growths may be amply secured by bast.

In training any plant the gardener should never forget that it is better to *lead* its activities in the desired direction rather than to attempt to drive or force it, which last often proves fatal. The final aim should be kept consistently in view and patiently awaited, whether it be the production of a perfect flower or of a well-shaped tree.—T. C. D.

[See also articles on *PRUNING FRUIT TREES* and *PRUNING ROSES AND SHRUBS*.—EDITOR.]

TRAINING OF WOMEN STUDENTS.—See *WOMEN GARDENERS*.

TRANSPIRATION.—See *PLANT PHYSIOLOGY*. It is also referred to in *BOTANY FOR GARDENERS*, and *LEAVES OF PLANTS: THEIR FUNCTIONS*.

TRANSPLANTING.

The work of transplanting is an important detail in the life and growth of all horticultural subjects, embracing as it does a wide sphere, and upon the manner in which the work is carried out may depend the future success or failure of the subject in question.

The term transplanting covers a wide area embracing vegetables, flowers, plants with tap-roots as well as fruit trees, small fruit trees and shrubs, although the term is more commonly applied to seedlings.

Vegetables.—In the case of such crops as Cabbage, or any of the

Brassica tribe, these, we may say, entirely owe their success to the initial detail of transplanting when the seedlings are large enough to handle. Many unsatisfactory crops can be traced to the wrong method of transplanting, or indeed the want of method. Very often the work is delayed too long; thus the plants become drawn up, weak, and attenuated owing to a want of space for free development. The plants when pulled up, as they are all too often, receive a check straightaway. Many of their fibrous roots are injured at the time, and the plants have to set to and recuperate themselves owing to the loss of wherewithal to establish themselves. Overcrowding in the seed-bed often results in what are known as "leggy" plants, which never become as sturdy in their subsequent growth as those that were transplanted earlier.

The common method of drawing Brassica or indeed any other seedlings from the seed-bed is highly unsatisfactory, even when the plants are as strong as one might desire. Instead of pulling up such subjects as Lettuce or Onions, for example, especially in dry weather, and thereby injuring their roots, the correct method of taking them out of the seed-bed is first to water the soil if the weather is dry, thus ensuring the retention of fibrous roots, and instead of pulling up roughly, to lift them up with a hand-fork, and thus release the roots, which then leave the soil intact. The common method of planting is with a dibber, but for the pros and cons of this way of working the reader should refer to our notes on *DIBBERS: THEIR USE AND ABUSE*. A hand-fork and trowel are much the best tools for lifting and transplanting these small seedlings; by making a hole with the last, the roots are more evenly spread out, and the soil goes amongst the fibrous roots in such a manner that hardly any check takes place, the result being immediate new growth of a sturdy character.

Flowers. — The same remark applies to all seedling flowers such as Asters, Stocks, and such like; a little extra trouble and time spent makes all the difference between success and failure.

Plants with Tap-Roots.—In transplanting such subjects as Beet, Parsnips, or any plant with a tap-root which should remain intact, the rough pulling up of the plants is almost certain to lead to failure, since the loss of tap-root means a shorter root when the time comes for the harvesting of these subjects. Especially, then, it is necessary to lift these seedlings with a fork, and to prepare the new site with care for their future growth.

Shrubs or Trees.—In transplanting these, the main point is to spread the roots out carefully so that they are uniformly covered with soil from the base to the surface. The roots should be evenly disposed, the bulk of them being kept as near the surface as possible, in order that they may derive benefit from the warmth of the sun as well as from surface dressing of fertilisers, etc.

Mistakes to Avoid.—One of the greatest mistakes in fruit-tree and rose transplanting is that of allowing the roots to become dry while waiting to plant. The small fibrous portions are often so injured by exposure that they are useless, the tree having to form more before they can be of any use as sustainers of growth in supplying the liquid plant-food by which all plant-life exists.

E. M.

[It may be well to add that the mistake is to let any roots of plants, whatever the plants may be, become dry prior to setting them in new quarters, as such always results in a more or less severe check to growth. Usually it is quite possible to avoid them getting dry by taking a little trouble. As a rule trees and shrubs should never be pruned when being transplanted, though when necessary they may be root pruned. Another point to note is that manure should not be put in direct contact with the roots of trees and shrubs, or indeed anything during transplanting, nor should artificial fertilisers be used until the subjects have had time to become re-established.—EDITOR.]

TRANSPORTED DEPOSITS.— See under SUPERFICIAL DEPOSITS in *GARDEN GEOLOGY.*

TRAPS.

Ready-made traps can be purchased so cheaply for birds, mice, moles, rats, slugs, and snails that it is unnecessary to make them for oneself. Effective earwig traps can either be made by filling pots with hay, and putting them on the tops of dahlia poles, etc., or by cutting bean stalks into lengths and slipping them among the foliage of the plants. Cockroach and wasp traps are best made of wide-necked bottles filled partly with treacle, syrup, or some strong smelling viscid liquid. The former are put on the ground for the creatures to crawl into, while the latter are hung up in trees for the wasps to fly into. Both should be emptied at frequent intervals.

TRAPS AND POISONS : LAW AS TO.— See *GARDENING LAW.*

TRAVELLER'S JOY (*Clematis Vitalba*).—See *CLIMBING AND TRAILING PLANTS.*

TRAVERTINE.— See under LIMESTONE in *ROCKWORK.*

TREASURE FLOWER.—See *GAZANIA.*

TREATMENT OF FOLIAGE PLANTS. See *FOLIAGE PLANTS FOR ALL PURPOSES.*

TREATMENT OF FUNGOUS DISEASES.—See *APPLE DISEASES, DISEASES OF PLANTS, DISEASES OF ROCK PLANTS, FUNGOUS DISEASES, ONION DISEASES, PEACH DISEASES, POTATO BLIGHT, POTATO DISEASES, ROSE DISEASES, TOMATO DISEASES,* etc.

TREE BLECHNUM (*Blechnum brasiliense*).—See *FERNS AND FERN GARDENING.*

TREE HEATH (*Erica arborea*).— See *HEATHS* and *SHRUBS.*

TREE LUPINE (*Lupinus arboreus*).— See *LUPINE.*

TREE MALLOW (*Lavatera arborea*).— See *LAVATERA.*

TREE MALLOW : VARIEGATED.—See *VARIEGATED TREE MALLOW.*

TREE OF HEAVEN.— The genus AILANTHUS and *A. glandulosa.* See *TREES.*

TREE ONION.—See *ONION.*

TREE PAEONY.— See *PAEONY,* and under PAEONIA in *SHRUBS.*

TREE PINK (*Dianthus arboreus*).— See *DIANTHUS.*

TREE POPPY.— See the genus ROMNEYA in *SHRUBS.*

TREE PRUNERS.—See *GARDEN TOOLS.*

TREE STUMPS : CLOTHING.

Tree stumps are ugly, and serve to mar the garden rather than to beautify it in most cases, but it is a great pity to destroy them if their situation is such that plants may be grown over them. Many rock plants, such as Alyssum, Arabis, Aubrietia, and Cerastium will revel if allowed to romp over them, and will beautify the garden if allowed to do so. A fair proportion of the plants described in our article on *CLIMBING AND TRAILING PLANTS* may be planted in soil above such stumps to ramble over them with great effect; indeed there is no end to the possibilities of tree stumps in the hands of intelligent gardeners.

TREE STUMPS : DESTROYING.

It is sometimes necessary to destroy tree stumps if these are situated in positions where it is impossible to beautify them by clothing them in the ways mentioned in the preceding article. Various methods have been suggested, such as drilling holes and watering with saltpetre solution, and a week later lighting a small fire on the top, but this involves a good deal of unnecessary waste of what might be utilised as valuable fuel. It is a far better plan to drive iron wedges into the stumps with a sledge-hammer, and so split each stump first of all into two halves. Then by repeating the process across the length of the two halves the stumps are divided into four. Usually such pieces can be lifted without much difficulty, though, of course, the roots holding the stump into the ground must first be cut through. The split pieces can either be further cut up before use, or put just as they are into the greenhouse furnace, when they will keep the fire in for a long period, as the wood will be damp.

TREE WASP.—See under Wasps in *Insect Pests.*

TREE WOUNDS.

Fruit Trees especially are very liable to wounds of various kinds, due sometimes to carelessness in pruning, sometimes to the wind moving their stakes about and so chafing away the bark, while at other times their cause is difficult to account for. These wounds if neglected may have serious consequences, and mean the premature death of the tree owing to bleeding, or to the letting in of diseases. The best thing to do is to paint them over as soon as possible either with Stockholm Tar or Burgundy Pitch. Special Styptics are on the market, the use of which gives good results, though as a rule these are somewhat expensive.

TREES.

In the present edition we are not attempting general descriptions of Garden Trees, or an exhaustive list of these, but we give below a selection of easily-grown, desirable species, with a few of the best varieties. All are hardy, unless otherwise indicated, in average districts of the United Kingdom. The letters in parentheses immediately after the botanical name indicate the nature of the tree, whether evergreen or otherwise, *E.* standing for hardy evergreen; *D.* for hardy deciduous; *H.H.E.* for half-hardy evergreen; *H.H.D.* for half-hardy deciduous; *T.E.* for tender evergreen; and *T.D.* for tender deciduous. *C.* after the generic title shows that the tree belongs to the Conifers. On account of the confused nature and large number of synonyms it has been thought best to omit most of these. The heights given are approximately those attained by the trees in cultivation, but these vary greatly under different conditions, and in their native habitats vary more greatly still. Some of the trees have not been sufficiently long in cultivation in this country to show the stature they will eventually attain, hence the omission of a certain number of heights. In future editions it is hoped that further information on this point will be available.—Editor.

List of Useful Garden or Park Trees.

	Feet
ABIES (*C.*) Fir.	
A. amabilis (*E.*).—Red Fir.	60–80
A. balsamea in variety[1] (*E.*).—Balm of Gilead and Balsam Fir.	3–60
A. bracteata (*E.*).—Santa Lucia Fir.	60–100
A. cephalonica (*E.*).—Greek Fir.	50–80

---

[1] A short-lived tree. Its variety *hudsonica* is known as the Dwarf Balsam Fir.—Editor.

	Feet
A. cilicica (*T.E.*).—Cilician Fir.	60–100
A. concolor in variety (*E.*).—Colorado White Fir.	100
A. firma (*E.*).—Japanese Silver Fir.	50–100
A. Fraseri[1] (*E.*).—Fraser's Silver Fir.	50–100
A. grandis (*E.*).—Tall Silver or Giant Fir.	150–200
A. homolepis (*E.*).—Nikko Silver Fir.	60–90
A. lasiocarpa (*E.*).—Rocky Mountain Fir.	50–100
A. pectinata (*E.*).—Silver Fir.	50–100
A. Pindrow (*E.*).—Himalayan Fir.	60–80
A. Pinsapo (*E.*).—Spanish Fir.	60–80
A. religiosa (*T.E.*).—Sacred Fir.	70
A. sachalinensis (*E.*).—Saghalien Fir.	
A. sibirica (*E.*).—Siberian Fir.	30–70
A. Veitchii (*E.*).—Veitch's Silver Fir.	60–70
A. webbiana (*E.*).—Indian Silver Fir.	
ABIETIA (*C.*).—A synonym of *Pseudotsuga*, which see.	
A. Douglasii.—A synonym of *Pseudotsuga Douglasii*, which see.	
ACER. Maple.	
A. argutum (*D.*).	
A. campestre (*D.*).—Common Maple.	20
A. carpinifolium (*D.*).	
A. circinatum (*D.*).—Vine Maple.	6
A. cissifolium, Syn. *Negundo cissifolium* (*D.*).	10
A. coriaceum (*D.*).	
A. crataegifolium (*D.*).	10
A. dasycarpum in variety (*D.*). Scotch or Silver Maple.	60
A. diabolicum (*D.*).	
A. distylum (*D.*).	
A. Ginnala (*D.*).—A variety of *A. tataricum.*	
A. glabrum (*D.*).	15–30
A. grandidentatum (*D.*).	
A. Heldreichi (*D.*).	
A. heterophyllum (*E.*).	4
A. insigne (*D.*).	
A. japonicum (*D.*).	20
A. macrophyllum (*D.*).	60
A. monspessulanum (*D.*).—Montpelier Maple.	8
A. Negundo in variety (*D.*).—Box Elder.	20
A. nikoense, Syn. *Negundo nikoense* (*D.*).	
A. opulifolium (*D.*).—Italian Maple.	8–20
A. palmatum in variety (*D.*).	10–20
A. pennsylvanicum (*D.*).—Moose Wood.	20
A. pictum in variety (*D.*).	10–20
A. platanoides (*D.*).—Norway Maple.	60
A. Pseudo-platanus[2] (*D.*).—Sycamore.	80–100
A. rubrum (*D.*).—Red Maple.	20
A. saccharinum (*D.*).—Sugar Maple.	40
A. sikkimensis (*D.*).	
A. spicatum (*D.*).—Mountain Maple.	
A. tataricum (*D.*).	20–40
ÆSCULUS. Chestnut.	
Æ. alba (*D.*).	8
Æ. californica (*D.*).	20
Æ. carnea (*D.*).—Red Horse Chestnut.	12–20
Æ. chinensis (*D.*).—Chinese Chestnut.	15
Æ. flava (*D.*).—Sweet Buckeye.	20
Æ. glabra (*D.*).—Ohio Buckeye.	20
Æ. Hippocastanum (*D.*).—Common Horse Chestnut.	40
Æ. indica (*D.*).—Indian Horse Chestnut.	40
Æ. octandra (*D.*).	
Æ. Pavia (*D.*).—Red Buckeye.	8–20
AILANTHUS. Tree of Heaven.	
A. glandulosa (*D.*).—Tree of Heaven.	20
A. vilmoriniana (*D.*).	20
ALNUS. Alder.	
A. cordifolia (*D.*).	15–50
A. firma (*D.*).	
A. glutinosa in variety (*D.*).—Common Alder.	50–60
A. incana in variety (*D.*).—Grey Alder or Speckled Alder.	20
A. japonica (*D.*).	
A. maritima (*D.*).—Seaside Alder	20–30
A. nepalensis (*D.*).	
A. nitida (*D.*).—Gira or Himalayan Alder.	100
A. oregona (*D.*).	20
A. rhombifolia (*D.*).—White Alder.	20

---

[1] A short-lived tree.—Editor.

[2] Its variety *flavo-marginatum* is known as the Corstorphine Plane.—Editor.

	Feet
A. rubra (*D.*).	20
A. serrulata (*D.*).	20
A. subcordata (*D.*).	
A. viridis (*D.*).—Mountain Alder.	20
ARAUCARIA (*C.*).—Chili Pine or Monkey Puzzle.	
A. imbricata (*E.*).—Monkey Puzzle.	30–100
ARBUTUS. See article on *Shrubs*.	
ATHROTAXIS (*C.*).	
A. cupressoides (*H.H.E.*).	30
A. laxifolia (*H.H.E.*).	25
A. selaginoides (*H.H.E.*).	40
BETULA. Birch.	
B. alba in variety (*D.*).	30–60
B. alpestris (*D.*)	Dwarf
B. corylifolia (*D.*).	
B. davurica (*D.*).	30
B. Ermani (*D.*).	
B. fontinalis (*D.*).	
B. fruticosa (*D.*).	6
B. lenta (*D.*).—Cherry Birch.	60–70
B. lutea (*D.*).—Yellow Birch.	70
B. Maximowiczii (*D.*).	30
B. nana (*D.*).	4
B. nigra (*D.*).—Red Birch or River Birch.	60–70
B. occidentalis (*D.*).—Black Birch.	10
B. papyrifera (*D.*).—Canoe Birch or Paper Birch.	60
B. populifolia (*D.*).—Gray Birch.	30
B. pubescens (*D.*).—White Birch.	30
B. pumila (*D.*).—Low Birch.	6
B. utilis (*D.*).	
BROUSSONETIA.	
B. papyrifera (*D.*). — Paper Mulberry.	10–30
CARPINUS. Hornbeam.	
C. americana (*D.*).—American Hornbeam.	10–60
C. Betulus (*D.*).—Horbneam.	30–60
C. caroliniana (*D.*).—American Hornbeam.	20
C. cordata (*D.*).	
C. japonica (*D.*).	15
C. orientalis (*D.*).	10
CARYA. Hickory.	
C. alba (*D.*). — Shell-bark Hickory or Small-leaved Hickory.	30
C. amara (*D.*).—Bitter-nut.	50–70
C. aquatica (*D.*). — Bitter Pecan or Water Hickory.	80
C. myristicaeformis (*D.*).—Nutmeg Hickory.	
C. olivaeformis (*D.*).—Pecan.	30
C. porcina (*D.*).—Pig-nut	30
C. sulcata (*D.*).—Big Shellbark and King-nut.	30
C. tomentosa.—Mocker Nut.	60–70
CASTANEA. Sweet or Spanish Chestnut.	
C. crenata (*D.*).—Japanese Chestnut.	80–100
C. dentata (*D.*).—American Chestnut.	
C. sativa (*D.*).	50
CASTANOPSIS.	
C. chrysophylla (*E.*).—Golden-leaved Chestnut.	10
CATALPA. Indian Bean.	
C. bignonoides (*D.*).—Indian Bean.	20–40
C. Bungei (*D.*).—Mop-headed Catalpa.	6–10
C. cordifolia (*D.*).—Western Catalpa.	20
C. Kaempferi (*D.*).	
CEDRELA. Bastard Cedar.	
C. sinensis (*D.*).	
CEDRUS (*C.*). Cedar.	
C. atlantica and varieties (*E.*).—Atlas Cedar	80–100
C. Deodora (*E.*).—Deodar or Indian Cedar.	150
C. Libani (*E.*).—Cedar of Lebanon or Lebanon Cedar.	60–80
CELTIS. Nettle Tree.	
C. australis (*D.*).	30–40
C. mississippiensis (*D.*)—Sugarberry.	20
C. occidentalis (*D.*).—Hackberry.	30
C. Tournefortii (*D.*).	15
CEPHALOTAXUS (*C.*). Japanese Yew.	
C. drupacea (*E.*).	6–15
C. Fortunei (*E.*).	6–20
C. pedunculata (*E.*).	6–8
CERCIS. Judas Tree.	
C. canadensis (*D.*).—Redbud.	15
C. Silquastrum (*D.*).—Judas Tree.	20
CHAMAECYPARIS. White Cedar. See Cupressus.	
CLADRASTIS.	
C. amurensis (*D.*).	6
C. tinctoria (*D.*).—Yellow Wood.	15
CORYLUS. Hazel.	
C. americana (*D.*).	4–8
C. Avellana (*D.*).—Common Hazel.	10–40
C. Colurna (*D.*).—Constantinople Hazel.	60
C. heterophylla (*D.*).	10
C. mandshurica (*D.*).	8
C. maxima (*D.*).	10
C. rostrata (*D.*).	5

	Feet
CRATAEGUS. Thorn.	
C. apiifolia (*D.*).—Parsley-leaved Thorn.	15
C. Azarolus (*D.*).—Azarole.	15–20
C. Carrièrei, Syn. *C. mexicana Carrièrei* (*H.H.E.*).	12
C. coccinea.—Scarlet Haw.	20
C. cordata (*D.*).—Washington Thorn.	10
C. crenulata (*H.H.D.*).	10
C. Crus-galli in variety (*D.*).—Cockspur Thorn and Newcastle Thorn.	30
C. Douglasii (*D.*).	15
C. flava (*D.*).—Yellow Haw.	20
C. heterophylla (*D.*).	20
C. Korolkowi (*D.*).	
C. melanocarpa (*D.*).	15
C. mexicana (*H.H.E.*).	15
C. mollis (*D.*).	20
C. monogyna praecox (*D.*).—Glastonbury Thorn.	15
C. nigra (*D.*).	20
C. orientalis (*D.*).	15
C. Oxyacantha (*D.*).—Hawthorn and Whitethorn.	10–20
C. pentagyna (*D.*).	15
C. punctata (*D.*).	15
C. Pyracantha (*E.*).—Fire Thorn.	10–20
C. sanguinea (*D.*).	15
C. spathulata (*D.*).	12
C. tanacetifolia (*D.*).—Tansy-leaved Thorn.	12–20
C. tomentosa (*D.*).	20
C. viridis (*D.*).	15
CRYPTOMERIA (*C.*). Japanese Cedar.	
C. japonica in variety (*E.*).	50–100
CUNNINGHAMIA (*C.*).	
C. sinensis (*E.*).	40
CUPRESSUS (*C.*). Cypress.	
C. Benthami arizonica (*E.*).—Arizona Cedar.	40
C. funebris (*T.E.*).	50–60
C. goveniana (*E.*).[1]	50
C. lawsoniana in variety (*E.*).—Lawson Cypress.	75–100
C. lusitanica (*H.H.E.*).—Cedar of Goa.	40–50
C. macnabiana (*E.*).	30
C. macrocarpa in variety (*E.*).—Lambert's or Monterey Cypress.	50–80
C. nootkatensis in variety (*E.*).—Alaska or Yellow Cypress.	80
C. obtusa in variety (*E.*).—Japanese Cypress Retinospora.	20–30
C. pisifera in variety (*E.*).—Pea-fruited Retinospora.	40
C. sempervirens (*E.*).—Roman Cypress.	100
C. thyoides in variety (*E.*).—White Cedar.	70–80
C. torulosa (*E.*).—Himalayan Cypress or Tufted Cypress.	70–80
DIOSPYROS. Date Plum.	
D. Kaki (*H.H.D.*).—Date Plum or Kaki.	22
D. Lotus (*D.*).—Common Date Plum.	20
D. virginana (*D.*).—Persimmon.	20
EUCALYPTUS. Gum Tree.	
E. coccifera (*H.H.E.*).	40
E. Gunnii (*H.H.E.*).	50
E. urnigera (*H.H.E.*).	40
FITZROYA (*C.*)	
F. patagonica (*E.*).	10–12
FRAXINUS. Ash.	
F. americana in variety (*D.*).—White Ash.	20
F. angustifolia (*D.*).	20
F. anomala (*D.*).	5
F. berlandieriana (*D.*).	30–50
F. caroliniana (*D.*).—Swamp Ash or Water Ash.	30
F. chinensis (*D.*).—Green Ash.	5
F. dipetala (*D.*).—Fringe-flowered Ash.	
F. excelsior in variety[2] (*D.*).—Common Ash.	30–80
F. expansa (*D.*).	30
F. nigra (*D.*).—Black Ash.	30
F. oregona (*D.*).	
F. Ornus (*D.*).—Flowering or Manna Ash.	20–30
F. parvifolia (*D.*).	20
F. pennsylvanica[3] (*D.*).—Red Ash.	30
F. quadrangulata (*D.*).—Blue Ash.	30
F. rhynchophylla (*D.*).	
GINKGO (*C.*). Maidenhair Tree.	
G. biloba (*D.*).	15–20
GLEDITSCHIA. Water Locust.	
G. aquatica (*D.*).—Water Locust.	20
G. macracantha (*D.*).	20
G. sinensis, Syn. *G. ferox* (*D.*).	20
G. triacanthos (*D.*). — Honey Locust.	20

---

[1] A short-lived tree.

[2] Two useful varieties of the Common Ash are *pendula*, the Weeping Ash, and *pendula Wentworthi*, the Wentworth Weeping Ash.—Editor.

[3] Its variety *lanceolata* is known as the Green Ash.—Editor.

	Feet
JUGLANS. Walnut. See also article on *Nut Culture*.	
J. cinerea (*D.*).—Butternut.	30
J. nigra (*D.*).—Black Walnut.	30
J. regia in variety (*D.*).—Common Walnut.	40–60
JUNIPERUS (*C.*). Juniper.	
J. barbadensis (*H.H.E.*).—Red Cedar.	20
J. californica (*E.*).	40
J. canadensis (*E.*).	
J. chinensis in variety (*E.*).—Chinese Juniper.	10
J. communis (*E.*).—Common Juniper.	5–20
J. communis fastigiata in variety (*E.*).—Irish Juniper	20
J. communis hemisphaerica (*E.*).—Hedgehog Juniper	2–4
J. drupacea (*E.*).—Syrian Juniper.	25
J. excelsa (*E.*).—Greek or Tall Juniper.	20–40
J. mexicana (*E.*).	20–30
J. occidentalis (*E.*).	15–25
J. phoenicea in variety (*E.*).—Phoenician Juniper.	15–20
J. recurva (*E.*).—Weeping Indian Cedar.	15
J. rigida (*E.*).	20–25
J. Sabina[1] (*E.*).—Savin. (A trailer.)	1
J. scopulorum (*E.*).—Red Cedar.	30
J. taxifolia (*E.*).	15–20
J. tetragona in variety (*E.*).—Rock Cedar.	15–20
J. thurifera (*T.E.*).—Incense Cedar or Incense Juniper.	20–30
J. virginiana in variety (*E.*).—Red Cedar.	15–50
KOELREUTERIA.	
K. bipinnata (*H.H.D.*).	10
K. paniculata (*D.*).	10
LABURNUM.	
L. Adami (*D.*).—Purple Laburnum.	15–20
L. alpinum in variety (*D.*).—Scotch Laburnum.	15–20
L. vulgare in variety (*D.*).—Common Laburnum.	10–30
LARIX (*C.*). Larch.	
L. davurica (*H.H.E.*).	10–60
L. europaea (*E.*).—Common or European Larch.	80–100
L. Griffithii (*E.*).—Himalayan Larch. (Short-lived.)	40
L. leptolepis (*E.*).—Japanese Larch.	60–80
L. occidentalis (*E.*).—American Larch.	100
L. pendula (*E.*).—American Larch, Black Larch, Red Larch, and Tamarack.	50–70
LIBOCEDRUS (*C.*). Arbor Vitae or Incense Cedar.	
L. chilensis (*T.E.*).—Chilian Arbor Vitae.	60–80
L. decurrens (*E.*).—Incense Cedar.	30–100
LIQUIDAMBAR.	
L. orientalis (*D.*).	8
L. styraciflua (*D.*).—Sweet Gum.	30–60
LIRIODENDRON. Tulip Tree.	
L. tulipifera (*D.*).—Common Tulip Tree.	30–60
MAGNOLIA. See also articles on *Climbing and Trailing Plants* and *Shrubs*.	
M. acuminata (*D.*).—Cucumber Tree or Mountain Magnolia.	60
M. conspicua (*D.*).—Yulan.	30
M. Fraseri (*D.*).	30
M. grandiflora in variety (*E.*).—Bull Bay.	20
M. tripetala (*D.*).—Elk-wood or Umbrella Tree.	30
MORUS. Mulberry.	
M. alba (*D.*).—White Mulberry.	30
M. nigra (*D.*).—Black Mulberry.	20
NYSSA. Tupelo.	
N. sylvatica (*D.*).—Pepperbridge or Tupelo.	10
OSTRYA. Hop Hornbeam.	
O. carpinifolia (*D.*).—Hop Hornbeam.	20
O. japonica (*D.*).	20
O. virginica (*D.*).—Ironwood.	20
PAULOWNIA. Kiri.	
P. imperialis (*D.*).	30
PICEA (*C.*). Spruce.	
P. ajanensis (*E.*).—Yesso Fir.	60–120
P. alba (*E.*).—White Spruce.	45–70
P. alcockiana (*E.*).	60–75
P. breweriana (*E.*).—Weeping Spruce.	
P. Engelmanni (*E.*).—Engelmann's Spruce.	50–100
P. excelsa (*E.*).—Common Spruce or Norway Spruce.	60–140

---

[1] Its varieties *procumbens*, *prostrata*, and *tamarsicifolia* are known as the Waukegan Juniper, Carpet Juniper, and Spanish Savin respectively.—Editor.

	Feet
P. Morinda, Syn. *P. smithiana* (*E.*).—Himalayan Spruce.	80
P. nigra (*E.*).—Black Spruce.	25–50
P. obovata (*E.*).—Siberian Spruce.	60–80
P. Omorica (*E.*).—Servian Spruce.	60–80
P. orientalis (*E.*).—Eastern or Oriental Spruce.	50–80
P. polita (*E.*).—Prickly Fir.	50–100
P. pungens (*E.*).	80–100
P. pungens glauca (*E.*).—Blue Spruce.	80–100
P. sitchensis (*E.*).—Menzies or Sitka Spruce.	100
PINUS (*C.*). Pine.	
P. Ayacahuite (*E.*).—Hickory Pine.	80–100
P. balfouriana (*E.*).	26–30
P. banksiana (*E.*).—Bank's Pine.	30–60
P. bungeana (*E.*).—Lace Bark Pine.	80–100
P. Cembra (*E.*).—Stone Pine.	60–80
P. cembroides (*E.*).	15–20
P. contorta (*E.*).	10–30
P. Coulteri (*E.*).	50–80
P. excelsa (*E.*).—Bhotan Pine or Himalayan Fir.	50–150
P. flexilis (*E.*).	40–50
P. halepensis (*E.*).—Jerusalem Pine.	
P. insignis (*E.*).—Monterey Pine.	60–80
P. koraiensis (*E.*).—Corean Pine.	40–50
P. lambertiana (*E.*).—Sugar Pine.	150
P. Laricio in variety (*E.*).—Corsican Pine.	80–100
P. Laricio nigricans (*E.*).—Austrian Pine.	80–100
P. mitis (*E.*).—Yellow Pine.	
P. montana[1] (*E.*).—Mountain Pine. (Prostrate.)	4–8
P. monticola (*E.*).	80–100
P. muricata (*E.*).—Bishop's Pine.	25–50
P. palustris (*E.*).—True Pitch Pine.	50–80
P. parryana (*E.*).	30–40
P. parviflora (*E.*).	30–50
P. patula (*E.*).	60–80
P. Peuke (*E.*).	30–35
P. Pinaster (*E.*).—Cluster Pine.	50–80
P. Pinea (*T.E.*).—Stone or Umbrella Pine.	40–80
P. ponderosa (*E.*).—Heavy-leaved Pine.	60–90
P. pungens (*E.*).	25–40
P. pyrenaica (*E.*).—Calabrian Pine.	60–80
P. resinosa (*E.*).—Canadian Red Pine or Red Pine.	60–100
P. rigida (*E.*).—Pitch Pine.	40–70
P. sabiniana (*E.*).—Nut Pine.	40–60
P. Strobus (*E.*).—Weymouth Pine.	75–100
P. sylvestris in variety (*E.*).—Scotch Pine.	80–100
P. Taeda (*E.*).—Loblolly or Torch Pine.	80–100
P. Thunbergii (*E.*).—Japanese Black Pine.	80
PLATANUS. Plane.	
P. acerifolia (*D.*).—London Plane.	70
P. occidentalis (*D.*).—Button Wood.	70–80
P. orientalis (*D.*).—Common, Eastern, or Oriental Plane.	10
PODOCARPUS (*C.*).	
P. affinis, Syn. *Prumnopitys elegans* (*E.*).	10–30
POPULUS. Poplar.	
P. alba in variety (*D.*).—Abele or White Poplar.	60–100
P. balsamifera (*D.*).—Balsam Poplar.	70
P. berolinensis (*D.*).	60
P. canescens (*D.*).—Gray Poplar.	40
P. deltoidea (*D.*).—Cottonwood.	80–100
P. Fremontii (*D.*).	
P. grandidentata (*D.*).	60
P. heterophylla (*D.*).—Swamp Cottonwood.	60
P. lamifolia (*D.*).	40
P. laurifolia (*D.*).	70
P. nigra (*D.*).	60
P. nigra pyramidalis, Syn. *P. italica*. (*D.*).—Lombardy Poplar.	60
P. Sieboldii (*D.*).	
P. Simonii (*D.*).	80
P. suaveolens (*D.*).	
P. tremula (*D.*).—Aspen.	80
P. tremuloides (*D.*).—American Aspen.	60
P. tremuloides pendula (*D.*).—Parasol de St. Julien or Umbrella of St. Julien.	50
P. trichocarpa (*D.*).—Black Cottonwood.	70
P. tristis (*D.*).	
PRUNUS. Almond, Cherry, Plum.	

---

[1] Its variety *Pumilio* is very useful, and formerly was known as *Pinus Pumilio*.—Editor.

	Feet
P. acida in variety[1] (*D.*). Cherry.	20
P. americana (*D.*).—American Red Plum, Wild Red or Wild Yellow Plum.	8–20
P. Amygdalus (*D.*).—Almond. See also article on *Nut Culture.*	15–20
P. Amygdalus amara (*D.*).—Bitter Almond.	15–30
P. Amygdalus dulcis (*D.*).—Sweet Almond.	15–25
P. angustifolia (*D.*).—Chickasaw Plum and Mountain Cherry.	15–25
P. Armeniaca (*D.*).—Apricot. See also article on *Apricot.*	15
P. Avium in variety (*D.*).—Gean or Mazzard.	20–40
P. Besseyi (*D.*).—Sand Cherry.	
P. brigantiaca (*D.*).—Briançon Apricot.	6
P. Capollin (*D.*).	5–10
P. caroliniana (*H.H.E.*).—Mock Orange or Wild Orange.	20–30
P. cerasifera (*D.*).—Cherry Plum or Myrobalan Plum.	20
P. Cerasus in variety (*D.*).—Cherry, Dwarf Cherry, Morello Cherry, or Wild Cherry.	15–20
P. Chamaecerasus in variety (*D.*). Ground Cherry.	2–12
P. Cocumilio (*D.*).	20
P. communis in variety[2] (*D.*).—Wild Plum.	10–20
P. dasycarpa (*D.*). — Black Apricot.	15
P. davidiana (*D.*).	20
P. demissa (*D.*).	
P. divaricata (*D.*).	10–12
P. graeca (*D.*).	
P. hortulana (*D.*).—Wild Goose Plum.	20–30
P. humilis (*D.*).	4
P. insititia (*D.*). — Black Bullace, Bullace, or Bullace Plum.	10–20
P. Jacquemontii (*D.*).	6–10
P. japonica (*D.*).—Chinese Cherry.	2–3
P. Laurocerasus in variety (*E.*). Cherry Laurel.	6–20
P. lusitanica in variety (*E.*).—Portugal Laurel.	30
P. Maacki (*D.*).	
P. Mahaleb (*D.*) in variety. Bois de Ste. Lucie, or St. Lucie Cherry.	10
P. maritima (*D.*).—Beach Plum.	
P. miqueliana (*D.*).	
P. mollis (*D.*).	12–20
P. monticola (*D.*).	
P. Mume (*D.*).—Japanese Apricot or Mume.	20
P. nana (*D.*). — Russian Almond.	4
P. nigra (*D.*).—Canada Plum or Red Plum.	20
P. orientalis (*D.*).	10
P. Padus in variety (*D.*)—Bird Cherry.	12–40
P. pendula (*D.*).—Rose-bud Cherry.	10
P. pensylvanica (*D*). — Wild Red Cherry.	20–30
P. Persica in variety (*D*).—Peach. See article on *Peaches.*	15–30
P. prostrata (*D.*).	2
P. Pseudo-cerasus (*D.*).	6–15
P. Puddum (*D.*).	15–20
P. pumila (*D.*).—Sand Cherry.	4
P. serotina (*D.*).—Rum Cherry or Wild Black Cherry.	20
P. serotina salicifolia (*D.*).—Capollin.	20
P. serrulata (*D.*).	15
P. Simonii (*D.*). — Apricot Plum.	10
P. spinosa (*D.*).—Blackthorn or Sloe.	5–10
P. triflora (*D.*).—Japanese Plum.	5–10
P. virginiana (*D.*).—Choke Cherry.	20–80
P. Watsoni (*D.*).—Sand Plum.	6–10
PSEUDOLARIX (*C*).—Golden or Chinese Larch.	
P. Kaempferi, Syn. *Laricopsis Kaempferi* (*E.*).	40–80
PSEUDOTSUGA (*C.*).	
P. Douglasii, Syn. *Abietia Douglasii* (*E.*).—Douglas Fir.	80–120
PTEROCARYA.	
P. caucasica (*D.*).	20–40
PYRUS. Apple, Crab, Pear.	
P. americana (*D.*).—American Mountain Ash.	15
P. arbutifolia (*D.*).—Chokeberry.	2–10
P. Aria in variety (*D.*).—White Beam.	40
P. Aucuparia in variety (*D.*). Mountain Ash, Rowan, or Rowan Tree.	30
P. auricularis (*D.*).	20
P. baccata (*D.*). — Siberian Crab.	15

---

[1] Its variety *semperflorens* is known as All Saints' Cherry.—Editor.

[2] Its varieties *juliana* and *pruneauliana* are known as Prunier de St. Julien and Quetsche.—Editor.

	Feet
P. betulaefolia (*D.*).	20
P. Chamaemespilus in variety (*D.*).	6–10
P. communis in variety (*D.*). Wild Pear.	30–40
P. cordata (*D.*).	
P. coronaria (*D.*).—American Crab Apple.	20
P. Cydonia in variety (*D.*).	10
P. floribunda in variety (*D.*).	5–8
P. germanica (*D.*).—Medlar.	10–20
P. japonica in variety (*D.*).	10
P. Malus in variety (*D.*).—Crab Apple.	30
P. niedzwetzkyana (*D.*).—Mandschurian Crab.	15
P. nivalis (*D.*).—Snowtree.	6
P. Pashia (*D.*).	20
P. pinnatifida (*D.*).	30
P. prunifolia (*D.*).	20
P. Ringo (*D.*).	20
P. rivularis (*D.*). — Oregon Crab Apple.	20
P. salicifolia (*D.*).	
P. Sargentii (*D.*).	
P. sikkimensis (*D.*).	15
P. Simonii (*D.*).	
P. sinensis (*D.*).—Sand Pear.	30
P. Sorbus (*D.*).—Service Tree.	30
P. spectabilis (*D.*).	20
P. spuria (*D.*).	20
P. thianschanica (*D.*).	6–12
P. Toringo in variety (*D.*).	8–20
P. Torminalis (*D.*). — Wild Service Tree.	10–60
P. trilobata (*D.*).	20
P. vestita (*D.*).	10–18

QUERCUS. Oak.

	Feet
Q. acuta (*E.*).—Akakasi.	20
Q. Aegilops in variety (*D.*).—Valonia Oak.	20–50
Q. agrifolia (*E.*).—Encina or Enceno Oak.	20
Q. alba (*D.*).—American White Oak, Quebec Oak, or White Oak.	60
Q. Ballota (*D.*).—Barbary Oak or Sweet Acorn Oak.	50
Q. bicolor (*D.*).—Swamp White Oak.	60
Q. Catesbaei (*D.*).—Scrub Oak.	15–30
Q. Cerris[1] (*D.*).—Turkey Oak.	40–60
Q. cinerea (*Sub-E.*).—Blue Jack.	30
Q. coccifera (*E.*).—Kermes Oak.	10–15
Q. coccinea (*D.*).—Scarlet Oak.	50
Q. conferta (*D.*).—Hungarian Oak.	30
Q. cuneata (*D.*).—Spanish Oak.	
Q. cuspidata (*E.*).	30
Q. densiflora (*D.*).—Tan Bark Oak.	10–30
Q. Douglasii (*D.*).—Blue Oak.	
Q. Esculus (*D.*).—Italian Oak.	20–30
Q. falcata (*D.*).—American Spanish Oak.	80
Q. glabra (*E.*).—Japanese Oak.	30–40
Q. glandulifera (*E.*).—Iodame.	20
Q. glauca (*D.*).—Ara kasi.	30
Q. humilis (*D.*).	1–12
Q. Ilex (*E.*).—Evergreen Holly or Holm Oak.	60
Q. ilicifolia (*D.*).—Bear Oak.	3–8
Q. imbricaria (*D.*).—Laurel or Shingle Oak.	30–40
Q. Kelloggii (*D.*).	30–100
Q. lanuginosa (*D.*).	30
Q. laurifolia (*D.*).	100
Q. Libani in variety (*D.*).—Lebanon Oak.	30
Q. lobata (*D.*).—Valley Oak.	100
Q. lucombeana (*D.*).—Lucombe Oak.	80
Q. lyrata (*D.*)—Overcup Oak.	50
Q. macrocarpa (*D.*)—Burr Oak.	40
Q. marilandica (*D.*). — Black Jack.	80–100
Q. Mirbeckii (*D.*).	40
Q. Muehlenbergii (*D.*).—Yellow Chestnut Oak or Yellow Oak.	
Q. nigra (*D.*).—Water Oak.	8–25
Q. palustris (*D.*).—Pin Oak.	60
Q. pedunculata in variety[2] (*D.*).—Common Oak.	80
Q. Phellos in variety (*D.*).—Willow Oak.	100
Q. phillyraeoides (*D.*).	50
Q. pontica (*D.*).	10–20
Q. prinoides (*D.*).—Chincapin Oak.	
Q. Prinus in variety (*D.*).—Chestnut Oak.	20–40
Q. Pseudo-suber (*E.*).—Bastard Cork Oak.	50
Q. pumila (*D.*).—Running Oak.	
Q. reticulata (*H.H.E.*).	15
Q. rubra in variety (*D.*).—Red Oak.	80
Q. serrata (*H.H.E.*)	6
Q. sessiliflora (*D.*).	60
Q. stellata (*D.*).—Post Oak.	60
Q. Suber (*E.*).—Cork Oak.	25
Q. texana (*D.*).	
Q. thalassica (*E.*).	8

---

[1] Its variety *fulhamensis* is known as the Fulham Oak.—Editor.

[2] Its varieties *fastigiata*, *filicifolia*, and *pendula* are the Cypress Oak, Fern-leaved Oak, and Weeping Oak respectively.—Editor.

	Feet
Q. Toza (*D.*).	40
Q. Turneri (*E.*).	60
Q. undulata (*D.*).—Scrub Oak.	2–25
Q. velutina (*E.*).—Yellow Bark Oak.	70–80
Q. Wislizeni (*D.*).	70–80
ROBINIA. Rose Acacia.	
R. hispida (*D.*).—Rose Acacia.	6–12
R. Kelseyi (*D.*).	10
R. neomexicana (*D.*).	6–12
R. Pseudacacia in variety (*D.*).—False Acacia and Locust Acacia.	30–50
SALIX. Willow.	
S. alba in variety (*D.*).—White Willow.	80
S. alba caerulea (*D.*).—Cricket Bat Willow and Scarlet Bark Willow.	40
S. aurita (*D.*).	20
S. babylonica (*D.*).—Weeping Willow.	30
S. caerulea (*D.*). See *S. alba caerulea*.	
S. candida (*D.*).—Sage Willow.	10
S. Caprea in variety (*D.*).—Common Sallow or Goat Willow.	40
S. cinerea in variety (*D.*).	30–40
S. cordata (*D.*).	10–30
S. daphnoides (*D.*).—Violet Willow.	10
S. elegantissima (*D.*).	30
S. fragilis (*D.*).—Crack Willow.	80
S. gracilistyla (*D.*).	20
S. lanata (*D.*).	10
S. lucida (*D.*).—Shining Willow.	12–15
S. nigra (*D.*).—Black Willow.	16–25
S. nigricans in variety (*D.*).	6–10
S. pentandra (*D.*).—Bay-leaved Willow.	6–20
S. petiolaris [1] (*D.*).	6–20
S. phylicifolia in variety (*D.*).—Tea-leaved Willow.	10
S. purpurea in variety [2] (*D.*).—Purple Osier.	5–10
S. retusa (*D.*).	10
S. rosmarinifolia (*D.*).	4
S. triandra (*D.*).—Almond-leaved, Apple, or French Willow.	20
S. viminalis in variety (*D.*).—Common Osier or Osier.	30
S. viridis (*D.*).	30
SAMBUCUS. Elder.	
S. canadensis (*D.*).—Canadian Elder.	4–6
S. nigra in variety [3] (*D.*)—Bour Tree or Common Elder.	25
S. racemosa in variety (*D.*).—Berried Elder, Hart's Elder, and Red-berried Elder.	10–20
SASSAFRAS. Sassafras Tree.	
S. officinale (*D.*).	30
SAXEGOTHEA (*C.*).	
S. conspicua (*E.*).—Prince Albert's Yew.	20
SCIADOPITYS (*C.*).	
S. verticillata (*E.*).—Umbrella Pine.	50–100
SEQUOIA (*C.*). Californian Redwood.	
S. gigantea (*E.*).—Mammoth Tree or Wellingtonia.	100–200
S. sempervirens (*E.*)—Redwood.	100–200
SOPHORA.	
S. japonica (*D.*).—Pagoda Tree.	40
S. tetraptera (*D.*).—Houma.	12
TAXODIUM (*C.*). Deciduous Cedar.	
T. distichum in variety (*D.*).—Deciduous Cypress.	80–100
T. heterophyllum (*D.*).	6–10
TAXUS (*C.*). Yew.	
T. baccata (*E.*).—Common Yew.	30–50
T. baccata Dovastoni (*E.*).—Westfelton Yew.	30–50
T. baccata fastigiata in variety (*E.*).—Irish Yew.	30–50
T. brevifolia (*E.*).—Californian Yew.	
T. canadensis (*E.*).—Canadian Yew.	2–3
T. cuspidata (*E.*).—Japanese Yew.	
THUYA (*C.*). Arbor Vitae.	
T. dolabrata (*E.*).—Japanese Thuya.	40–50
T. gigantea in variety (*E.*).—Lobb's Arbor Vitae.	50
T. japonica (*E.*).—Japanese Arbor Vitae.	20–30
T. occidentalis in variety (*E.*).—American Arbor Vitae.	50
T. orientalis in variety (*E.*).—Chinese Arbor Vitae.	20–25
T. plicata (*E.*).—Canoe or Red Cedar.	50
TILIA. Lime.	
T. americana (*D.*).—Basswood.	70

---

[1] Its variety *sericea* is the Silky Willow.—Editor.

[2] Its variety *pendula* is the American Weeping Willow.—Editor.

[3] Its variety *foliis aureis* is the Golden Elder.—Editor.

	Feet
T. amurense (*D.*).	60
T. argentea (*D.*).—White Lime.	30–50
T. cordata (*D.*).	50
T. dasystyla (*D.*).	30–60
T. heterophylla (*D.*).—Bee-Tree, or White Basswood.	30–50
T. mandschurica (*D.*).	
T. miqueliana (*D.*).	
T. petiolaris (*D.*).	50
T. platyphyllos in variety (*D.*).	50
T. pubescens (*D.*).	60
T. vulgaris (*D.*).—Common Lime.	50
TORREYA (*C.*). Nutmeg.	
T. californica (*E.*).—Californian Nutmeg.	40–70
T. nucifera (*E.*).—Japanese Torreya.	20–30
TSUGA (*C.*). Hemlock Fir.	
T. canadensis in variety (*E.*).—Hemlock Spruce.	75–90
T. diversifolia (*E.*).—Japanese Mountain Hemlock.	70
T. mertensiana (*E.*).—Prince Albert's Fir.	70–100
T. Sieboldi (*E.*).—Japanese Hemlock Fir, or Japanese Hemlock Spruce.	
ULMUS. Elm.	
U. alata (*D.*).—Wahoo, or Winged Elm.	30–50
U. americana (*D.*).—American or White Elm.	45
U. campestris in variety[1] (*D.*).—Common Elm.	80
U. crassifolia (*D.*).—Cedar Elm.	
U. fulva in variety (*D.*).—Slippery Elm.	60
U. glabra in variety[2] (*D.*).	60
U. montana in variety[3] (*D.*).—Scotch or Wych Elm.	40
U. parviflora (*D.*).	5–10
U. pedunculata (*D.*).	60
U. racemosa (*D.*).—Rock Elm.	60–100
ZELKOVA. Water Elm.	
Z. acuminata (*D.*).—Keaki.	12
Z. crenata (*D.*).—Siberian Elm.	12
Z. Verschaffelti (*D.*).	10

S. A.

TREES AND CLIMBERS FOR GARDENS.—See *Town and City Gardening.*

TREES, CUTTING OF: Law as to.—See *Gardening Law.*

TREES: Planting.—See *Planting.*

TREES: RAISING FROM SEED.

[So much re-afforestation is now necessary on account of the enormous drain on our wood supplies that we feel a brief sketch of this subject will be useful to those who may want to help on the national work. For fuller details larger encyclopædias or works on forestry must be consulted.—Editor.]

Making the Seed-Beds.—Before starting to make the seed-beds, we must first know how many plants will be required to plant a given area and to replace deaths during the first few years. Suppose an area of 20 acres is to be planted with trees 4 ft. apart, 2722 trees will be needed per acre. The mortality of plants from various causes may be reckoned at 10 per cent. Thus 2722 + 272 = 2994, or say 3000, which multiplied by 20 gives 60,000 as the number required.

The next thing is to find out how many seeds there are in 1 lb. of the species to be sown.

Let us take Scots Pine as an instance. There are approximately 75,000 seeds in 1 lb. If every grain of this seed germinated and came to maturity, there would be more than enough to plant 20 acres; but the average germinative capacity of Scots Pine is only about 65 per cent., roughly 49,000 plants from 1 lb. But, although there may be 49,000 seedlings at first, a large number of these will never, for various reasons, grow to strong plants, and must consequently be left out of the reckoning, since it is not safe to rely on getting more than 15,000 strong seedlings from 1 lb. of Scots Pine seed. Thus we find that it will take at least 4 lb. of seed to produce 60,000 strong seedlings.

---

[1] There are numerous varieties of the Common Elm. *U. c. sarniensis* is the Guernsey or Jersey Elm, and *U. c. suberosa* is the Cork-barked Elm.—Editor.

[2] Its variety *cornubiensis* is the Cornish Elm.—Editor.

[3] *U. m. fastigiata* is the Exeter Elm or Ford's Elm, and *U. m. nigra* is known as the Black Irish Elm.—Editor.

If the seeds are to be sown in lines along the bed as described later, the number of plants that can be grown per square yard is about 2500. (About 25 per cent. more seed can be sown per square yard on broadcast beds.) This, on a bed 3½ ft. wide with lines 6 ins. apart, seven to a bed, works out at 360 plants per lineal yard of drill, or ten plants per lineal inch, and about two per square inch of ground. Generous spacing will, however always produce a higher percentage of good plants.

As 1 yd. of the bed will grow 2500 plants, a bed 24 yds. long will be needed for 60,000. The ground upon which the beds are to be made should have been root-cropped, preferably with potatoes, the previous year, and during the winter should have been dug over roughly once or twice to allow frost and sun to sweeten the soil. A day or so before making the beds, it should be dug over again finely, all lumps broken and all big stones removed.

In making the beds, two garden lines should be stretched parallel, 3½ ft. apart, and some of the finest soil at the sides of the proposed bed should be added to raise it above the adjoining soil. The bed should then be raked very finely, until it is almost like coarse meal, and then levelled off. It must then be allowed to consolidate slightly before the seed is sown.

Methods of Sowing.—There are three principal methods of sowing, viz. broadcast sowing, line sowing, and dibbling. The third is only used when sowing such seeds as acorns, chestnuts, etc., and although seldom used now on nursery beds, is sometimes practised when sowing seeds direct into plantations.

When broadcast sowing, a "cuffing" board, shaped similarly to a rake, but with a board in place of the toothed head, is used to push back the top soil of the bed to either side from the centre, leaving a smooth surface upon which the seed is scattered evenly by hand or from a perforated tin. The cuffing board is then used to pull back the soil. This is done by placing the board behind the heap of soil and giving a sharp pull. An expert can, of course, spread the soil very evenly, but amateurs require a lot of practice, as the seeds must be buried at an even depth. If a board is not available the soil may be sifted on. The depth varies with the species, but a good rule is to bury it as deep as the length of the seed, allowing for a slight subsidence of the soil, especially with the larger seeds.

In line sowing, the lines may be made either along or across the beds, but when the latter method is employed, it is easier to hoe between them without treading on the beds, which must be avoided. When they run lengthwise, a line must be stretched every 6 ins., and a drill made with the corner of a hoe or the back of a light rake.

Another method of making the drills is to use a light wooden roller, which is encircled by bands of wood or iron spaced to requirements. These press into the soil as the roller is pulled along the bed, leaving small trenches for the reception of the seed. The roller can also be used for making lines across the bed, but with the bands running across the roller. The best method, however, of making the lines across the bed is by means of the Bavarian Drill Board.[1]

---

[1] For description of this tool and the sowing lath, a work on Forestry should be consulted.—EDITOR.

The best way to sow the seed is by means of the sowing horn, or the sowing lath, several types of which are easily made. The required quantity of seed is placed in the lath, which is turned over above each drill and the lid withdrawn, allowing the seed to fall into place.

After sowing is finished, the drills can be filled by drawing the back of a light rake over the beds, or if the drills are not sufficiently deep for this, some soil should be sifted on to the bed through a ¼-inch sieve.

Protection of Beds.—To protect the bed against mice, birds, etc., boards about 8 ins. wide should be fixed on edge along the sides of the bed, with 3 ins. of the width below ground, and covered with small mesh wire-netting fixed on frames about 6 ft. long, that can be lifted off when the bed is to be weeded, for protection against frost. These frames are sometimes covered with plasterers' laths placed about 1 in. apart. These not only help to keep the frost off, but also prevent too rapid evaporation of the frost by a hot sun.

Weeding.—During the whole time from sowing the seed to the lifting of the plants, weeds must be completely kept down, as once they get big it is difficult to remove them without lifting many seedlings as well. When the plants are in lines it is possible to use a hoe, which not only keeps down weeds but prevents excessive evaporation of moisture from the soil. In fact, hoeing is often better than watering and should even be done in addition to watering. The latter tends to cake the top soil, and evaporation is more rapid from caked surfaces. Mulching with leaf-mould or short grass cuttings is also useful to prevent this.

After Treatment. — When the planting area is exceedingly clean, very small plants can be used, and some species are fit to plant out at the end of the second year. If larger plants are needed, the seedlings must be lined out in the nursery for a year or two.

In lifting the seedlings, a fork or graip should be used, and the plants lifted clear of the bed, when the strongest ones can be selected and pulled out without damaging their roots.

With hard-woods, the tap roots may need pruning. This must be done with a sharp knife, but they must not be shortened too much, otherwise there will not be enough roots to keep the plants alive. After being lifted, the plants should for convenience sake be counted and tied in bundles of one to five hundred according to size, and are then ready to be carried, either to the nursery lines or to the planting area.—W. H. W.

TREES FOR SEASIDE GARDENS.—See *SEASIDE GARDENS.*

TREES AND SHRUBS FOR IRISH GARDENS.—See *IRISH GARDENING.*

TREES AND SHRUBS: TRAINING OF. See *TRAINING OF PLANTS.*

TREES: TRANSPLANTING.—See *TRANSPLANTING.*

TREFOIL.—See *TRIFOLIUM.*

TRELLIS WORK.

The mere suggestion of trellis work in a garden opens up many possibilities, for we realise how very attractive the growth of plants and flowers can be made by such supports. Trellis, of course, includes ornamental fixtures of metal and wood in either form assisting the proper training of roses and similar plants, and enabling gardeners to keep trailing subjects in order, and to adapt their use to quite small gardens.

Trellis is very useful when additional boundary height is needed; it adds to the appearance of walls and other buildings by enabling the gardener to hide them by foliage plants and creepers.

Metal arches, roseries, and porches are sold ready made. They are varied in design, and suitable for almost any style of architecture. Continuous covered-way espaliers of metal are not necessarily of metal trellis, but they may be used in conjunction with decorative schemes. Another type of close mesh trellis, rustic or made of wood laths, may be used as the division of the kitchen from the floral garden in the suburban villa plot where the two elements, profit and pleasure, are combined. Trellis porches, some covered with zinc, add to the appearance of the house and especially of the door giving entrance to the garden.

Wood trellis appeals to the professional and the amateur gardener alike, for it is easily adaptable, and can be worked to any space available. Cheap arches of trellis are made in stock sizes, and can be bought in widths varying from 4–6 ft., the depth being usually 1 ft., and the height generally about 8 ft. Trellis, extending when opened out, is made in 12-ft. lengths, the usual mesh being 3 ins.; the stock heights available are, when fixed, 2 ft., and every foot up to 6 ft. For filling up odd places bundles of laths 1 in. by 4 ins., in lengths of 6 ft., are sold. To and bottom rails, and inside rails, are also sold ready made.

Expanding trellis is sold plain, and it can be painted when fixed complete; but it is better when made of laths which have been first painted, and then the whole painted again when fixed. Another kind is made first and then creosoted. This resists decay very well, even when resting upon damp soil.

Gardeners who are handy with tools can greatly enhance the beauty of a flower garden by introducing trellis divisions and arcades; a succession of arches and trellis covered with roses makes a great difference in a garden and does not occupy much room; indeed, there is no end to the variety of combinations which can be made with lengths of trellis and arches and other ornamental structures. The handy workman can build up in this way summer-houses, and cover over passages and paths, shutting out back premises and unsightly corners.

Another very popular form of trellis is made of the thinnings of plantations, the prunings of larger trees, and rustic timber, sold by dealers for the purpose in suitable lengths. When made up tastefully it looks very well and does not require painting.

In fixing trellis posts it is best to tar the portions which are placed in the ground, and add to their stability by surrounding them with cement or concrete, or drive in short posts to which they should be fixed to help them to resist wind pressure, or they may snap at some weak point.

Miniature trellis for pot plants and for use in conservatories encourages the growth of such plants, and helps to spread the stems and trailing branches so that the full benefit of floral display can be had.

Wire trellis is not much used, as plants do not take to it readily unless it is thoroughly and frequently painted.

For plants which may be used on trellis work, reference should be made to our article on *CLIMBING AND TRAILING PLANTS*.—F. W. B.

TRENCHING.—See *SOIL CULTIVATION*.

TRESPASS OF NEIGHBOURS' FOWLS Etc. : LAW AS TO.—See *GARDENING LAW.*

TRIANGULAR BEDS : AREA OF.—See AREAS OF BEDS AND BORDERS in *ARITHMETIC AND GARDENING.*

TRICHERA.—Now included in the genus SCABIOSA. See *SCABIOUS.*

TRICHOLAENA.—Now included in the genus *PANICUM.*

TRICHOMANES.—For the best species see *FERNS AND FERN GARDENING.*

TRICHONEMA.—Now included in the genus *ROMULEA.*

TRICHOPILIA.—See *ORCHIDS.*

TRICUSPIDARIA.—For the best species see *SHRUBS.*

TRICYRTIS.—See *TOAD LILY.*

TRIENTALIS (Nat. Ord. Primulaceæ).—Only two species of this genus are usually grown, and both are suitable for the rock garden, rock border, or as edgings to herbaceous borders if given a shady and moist site. *T. americana,* known as the STAR-FLOWER, blooms about July, while *T. europaea* (Syn. *T. alsinaeflora*), the well-known CHICKWEED WINTER-GREEN, blooms in May. Both bear white flowers, both average 6 ins. in height, and both require nothing more than the usual culture given to small rock or border plants. The best means of propagation is a matter of opinion: some say seeds sown in summer, and others say root division in early March.

TRIFOLIUM (Trefoil and Clover. Nat. Ord. Leguminosæ).—This is a very large genus of hardy annuals and perennials, thriving in most light soils, and of the easiest culture. Very few are of any value in the garden, though sometimes grown for green manuring. The species named below, with their English names, are the best known: *T. agrarium,* the HOP CLOVER; *T. arvense,* the HARE'S-FOOT TREFOIL; *T. dubium,* the SHAMROCK of Irish fame; *T. fragiferum,* the STRAWBERRY CLOVER; *T. hybridum,* the ALSIKE CLOVER; *T. incarnatum,* the CRIMSON CLOVER; *T. Lupinaster,* the BASTARD LUPINE; *T. maritimum,* the TEASEL-HEADED CLOVER; *T. medium,* the MEADOW CLOVER; *T. pratense,* the COMMON CLOVER; *T. procumbens,* the HOP TREFOIL; *T. repens,* the DUTCH CLOVER; and *T. stellatum,* the STAR TREFOIL.

Border Species.—None of the above are of much value for herbaceous or perennial borders, as they are of too common a habit. Thus it may be well to name one here of real use, and distinctly uncommon. This, *Trifolium pannonicum,* bears yellowish flowers from June onwards, and averages about 12 ins. high.

RECENT SPECIES.

Trifolium uniflorum.—This bears purple and white flowers singly, not in heads as is usual. It is a good plant for the rock garden.

TRIGLOCHIN.—See *ARROW-GRASS.*

TRIGONELLA (FENUGREEK. Nat. Ord. Leguminosæ).—This is a large and unimportant genus mostly of hardy annuals, hardly worth cultivating. The medicinal use of *T. Foenum-graecum,* the COMMON FENUGREEK, is fully described in some of the older Herbals, but it has now fallen into disrepute. The plant bears white flowers in July, and averages about 2 ft. in height.

TRILLIUM (THREE-LEAVED NIGHTSHADE, TRINITY FLOWER, or WOOD-LILY. Nat. Ord. Liliaceæ).—This is a useful genus of hardy tuberous-rooted perennials suitable for border or rock garden culture. They require plenty of peat in the soil, which should nevertheless be light, and though they prefer a little shade, a sunny position will suit them. Propagation by seeds in the summer, and root division in the autumn or spring (at which last period they are best planted), is not a matter of very great difficulty, though there are some plants, it is true, which are easier to increase than these. Paxton says that the roots of all species are violently emetic.

What to Grow.—We recommend the following species—the dwarfer ones for rock garden purposes :—

Trillium californicum.—Syn. *T. ovatum,* which see.

T. cernuum.—This is a white May blooming sort about 1½ ft. high.

T. erectum (Syn. *T. foetidum*).—This, popularly known as BIRTH-ROOT, is a dark purple sort flowering in May, and growing about 1 ft. high.

T. erythrocarpum (Syn. *T. pictum*).—Some authorities consider this species, popularly known as the PAINTED WOOD-LILY, which bears white and red flowers, to be synonymous with *T. grandiflorum.* Its flowers are borne with some profusion from April to June, on plants 6–9 ins. high.

T. foetidum.—Syn. *T. erectum,* which see above.

T. grandiflorum (WAKE ROBIN).—This bears white or rosy-pink flowers from June to July, and averages 6 ins. in height.

T. ovatum (Syn. *T. californicum*).—This useful sort bears light purple blooms from May onwards, and grows about 6 ins. high.

T. pictum.—Syn. *T. erythrocarpum,* which see.

T. sessile californicum.—This is a favourite species bearing white flowers in May, and growing about 6 ins. high.

TRINIA (HONEYWORT. Nat. Ord. Umbelliferæ).—This is a genus of hardy biennial plants sometimes offered as choice subjects to unwary amateurs. All the species are worthless from a floral point of view, so the space is best planted with other subjects.

TRINITY FLOWER.—See *TRILLIUM.*

TRIODIA (Nat. Ord. Gramineæ). This is a genus of hardy perennial grasses only suitable for the wild garden. *T. cuprea* and *T. decumbens* are the two best species—the last is the HEATH GRASS, and is the least valuable of the two.

TRIPOLIUM.—Now included in the genus *ASTER.*

TRIPSACUM.—See *BUFFALO GRASS.*

TRITELEIA.—Now included in the genus *BRODIAEA.*

TRITICUM (WHEAT. Nat. Ord. Gramineæ). — Few gardeners realise that this genus contains the COMMON WHEAT (botanically known as *T. vulgare*), from which flour for bread is made. Most of the species are now classed in the genus *AGROPYRON,* on which a separate note appears, but the present genus includes that previously known as *Ægilops.* Both genera are very similar and contain mostly weed plants of no value. *T. monococcum* (ST. PETER'S CORN), and *T. polonicum,* the POLISH WHEAT, are grown to a very limited extent in gardens.

TRITOMA.—A synonym for *KNIPHOFIA,* which see.

TRITONIA.—See *MONTBRETIA.*

TROLLIUS (GLOBE FLOWER. Nat. Ord. Ranunculaceæ).—The four species of this hardy perennial which are described in our article on *WATER GARDEN : PLANTS FOR THE,* are very suitable for the perennial border if a damp situation is chosen. They are easily grown, very showy, and in every way highly desirable.

New Variety.

Trollius King Cup.—This is a late flowering sort bearing golden-yellow and orange flowers on erect branching stems.

TROPAEOLUM.—See *CLIMBING AND TRAILING PLANTS* and *NASTURTIUM*.

TROPICAL PLANTS.

The flora of the tropics is represented by hundreds of genera and species belonging to many Natural Orders, which, living under the varied conditions of the tropical world, present varying degrees of beauty or of usefulness, while quite a large number are of purely botanical interest only. Of the many beautiful tropical plants, a large number are included in the ordinary stove collections, while those whose usefulness renders them valuable to man are termed Economic or Medicinal plants, and are seldom met with outside our botanical gardens.

It will be readily understood that plants living in the tropics do so under widely different conditions in various regions, and it is necessary to provide conditions which shall approximate those obtaining in the natural regions from which the plants have been obtained. Generally speaking, this is a high temperature and abundant moisture during the growing season, with cooler and drier treatment during a period of rest.

It will be obvious that in a Gardening Dictionary planned for general use a fuller description of such tender plants would be out of place.

TROWELS.—See *GARDEN TOOLS*.

TRUE LAVENDER (*Lavandula vera*). See under Lavender in *POTHERBS*. See also *LAVANDULA*.

TRUE PITCH PINE (*Pinus palustris*). See *TREES*.

TRUFFLES.

These cannot be cultivated, generally speaking, in this country. They are, however, often found wild in Oak or Beech woodlands attached to gardens, and can be dug as required.

TRUMPET DAFFODILS. — See *DAFFODILS*.

TRUMPET FLOWER (*Tecoma radicans*).—See *CLIMBING AND TRAILING PLANTS*.

TRUMPET LILY (*Lilium longiflorum*). See *LILIES*.

TRYPSIN.—A ferment necessary for successful germination. See *GERMINATION OF SEEDS*.

TSUGA.—For the best species see *TREES*.

TUB GARDENING.

Very good gardening is possible in vases, tubs, boxes, or extra large pots. Such expedients are especially valuable where the garden is small, or limited to courtyards and such enclosures. Familiar examples of this gardening are seen in our window-boxes and the pot-grown plants of the greenhouse. In a number of the big gardens too, plants in tubs play some part, usually that of giving yet greater effect to some portion of the flower garden—perchance the terrace, or by a pathside, or grouped around some approach. But the great advantage of this branch of horticulture lies in the possibilities it provides, in allowing persons with restricted garden space to cultivate and enjoy the possession of plants otherwise impossible to have; also as being a means whereby some half-hardy plants can be used in the open air for a few months, and which, being so grown, can be easily moved to a frost-proof shelter when such time arrives. There would seem to be no need for putting plants in any receptacle if they will live out in the open ground safely through an average winter—but oftentimes they are so placed to satisfy some particular design or wish.

Suitable Receptacles.—Tubs and boxes may be made any size and painted any colour, but dark green is most likely to be in harmony with gardening surroundings and to give the most pleasing effect. Several holes must be bored in the bottom of each box or tub used to ensure proper drainage and aeration. If special boxes have to be made, it will be cheapest in the long-run to procure the best material; but excellent tubs can be had by sawing paraffin casks in half. Small margarine tubs also answer the purpose well. The most durable receptacles are, of course, of stone. In pot ware, beside the usual large pots common in gardens, there are artistic patterns obtainable, with large saucers in which to stand them. Large fancy jars, too, are to be had, and look well when filled with appropriate plants. To prevent a too rapid evaporation, pots and jars should be glazed. Window-boxes are sometimes seen done with glazed tiles.

Concerning Suitable Plants.—Although so many plants are amenable to culture in tubs and vases, yet some show better results than others. In making a choice of plants, we must consider their future development; otherwise tall or large, bushy specimens may be put in a vessel better adapted for small or dwarf-growing subjects. Free-growing plants want adequate room for soil and moisture, but these essentials can be over-subscribed, thus causing an unhealthy state of the soil and premature decay of roots. On the other hand a cramped plant or shrub generally wears an impoverished look — unless lavishly supplied with stimulants. A little practice soon enables one to choose the happy medium.

List of Plants.—A few old favourites answering well to this mode of treatment are: Agapanthus, Aloe, Aloysia, Aralia, Bay (sweet), Chamaerops, Chrysanthemum (annual and perennial sorts), Dracæna, Ferns (tree), Fuchsia, Funkia, Geraniums (Zonal, Oak-leaved and Ivy), Grevillea, Hydrangea, Kalmia, Laurustinus, Lilium, Myrtle, Oleander, Rhododendrons (dwarf), and Schizostylis.—C. T.

TUBEROSE (*Polianthes tuberosa.* Nat. Ord. Amaryllidaceæ).—This is a sweet-scented bulbous plant from Mexico, with thick fleshy white flowers borne on a long slender spike at regular intervals. The individual flowers are used for buttonholes and wreath-making after being wired. When grown in pots, they may be used for conservatory decoration. They are too strong scented for the majority of people in living rooms.

Culture.—There are two strains, the African and the American. The former may be potted in October, November, and December for flowering the following autumn, while the latter may be potted in February, March, and April for flowering the following winter. One bulb may be put in a 5-inch pot, or three in a 6-inch. A suitable compost for potting may be made up of fibrous loam, old decayed manure, leaf-mould, and silver sand. The bulbs after being potted should be plunged in a cool greenhouse or cold frame and no water given until growth commences. When this occurs and the young spike is 2 ins. long, the pots should be removed to a light airy position in a greenhouse, and frequent stimulants given. The spikes grow from 2 ft. to 3 ft. high, and after flowering the bulbs are of no further use.

If the more forward of the bulbs

are planted out in the open in early June in a warm and sunny position and given plenty of water, they will bloom in August or September in an ordinary season. Used in this way their heavy scent is very pleasant to get in whiffs as one passes the places where they are planted out. *Excelsior Pearl* is a good and favourite variety.

J. J. & E. T. E.

TUBEROUS-ROOTED CROPS. — See *KINDS OF CROPS.*

TUBERS: MANURES FOR.—See under CROP REQUIREMENTS in *MANURES.*

TUFTED CYPRESS (*Cupressus torulosa*).—See *TREES.*

TUFTED HAREBELL.—See *WAHLENBERGIA.*

TUFTED PANSY.—A name applied to *VIOLA*, which see.

TUFTED VETCH (*Vicia Cracca*).—See *VICIA.*

TULIP DISEASES and TULIP DIVISIONS.—See *TULIPS.*

TULIP POPPY (*Papaver glaucum*).—See *POPPIES: ANNUAL SPECIES.*

TULIP SPECIES.

There are a very large number of species, but their general cultivation cannot be recommended. The best species are *T. biflora, T. clusiana, T. cuspidata, T. Didieri, T. flava, T. fulgens, T. gesneriana, T. maculata, T. praecox, T. pulchella, T. triphylla,* and *T. violacea. T. sylvestris* is the WILD TULIP, only suitable for the wild garden. There is a good colour range in the above species, yellow, red, purple, and scarlet being some of the chief colours. The blooming period is mostly April, though some continue even until July, while the height of most rarely exceeds 1 ft. Detailed descriptions of all the above and hosts of others will be found in larger works.

TULIP TREE.—The genus LIRIODENDRON. See *TREES.*

TULIPS: History.—Tulip history begins in the year 1554 when the Ambassador of the Emperor Ferdinand saw Tulips growing in a garden on his way to Constantinople. Previous to the above date all is conjecture; but from the behaviour of the seedlings obtained from the first bulbs brought to middle and western Europe it may be presumed that Tulips had for a long time been cultivated in Turkey. The flower came into the limelight in the years 1634–1637 when that extraordinary speculation known as the Tulipomania took place. Many tales are connected with this period, founded upon the undoubted facts that many of the more famous varieties like *Semper Augustus* were sold for far more than their weight in gold. Ever since, it has been a favourite garden and florists' flower. In England it reached the zenith of its popularity from about 1840 to 1860. Then for twenty-five years it was somewhat under a cloud. The introduction of the fine tall race known as Darwin Tulips in 1889 has once more reinstated it in favour.

Books on Tulips.—For those who make a speciality of Tulips the following works will be useful: (1) *Tulips*, by the writer of this article, in the "Present Day Gardening Series"; and (2) the *Report of the Tulip Nomenclature Committee* issued by the Royal Horticultural Society in 1917.

Tulips: Special Feature. — A characteristic of the Tulip which is shared by few other flowers is its habits of "breaking." Except some yellow and red varieties, every garden Tulip begins life as a "self." Sooner or later the self-colour changes and the flower becomes striped or blotched. That is technically known as "breaking." No one can say when this change will occur. It may be in two or three years, or it may be not for twenty or thirty.

Technical Tulip Terms. — The tulip being a very old florists' flower many technical terms have grown up in connection with it. Some of the more common ones are :—

BREEDER or MOTHER TULIP, where the flower is all one colour.

BROKEN or RECTIFIED, where the flower has become striped.

FEATHERED, when in a broken flower the colour is confined to the edges of the petals.

FLAMED, when in a broken flower the colour is spread over the petals.

The BASE is the bottom part of the perianth segments or petals.

A ROSE is a tulip with a white ground and white base, and some shade of red markings.

A BYBLOEMEN has some shade of purple markings on a white ground. It has a white base.[1]

A BIZARRE is a flower with a yellow base and a yellow ground colour.

DROPPERS are small new bulbs which are formed at some distance below the old bulb. Two-year-old seedlings and young offsets almost always produce them.

PARROTS are varieties with laciniated petals.

Outdoor Tulip Culture. — Tulips do not thrive in grass. After a few seasons they practically refuse to bloom. Any good garden soil is suitable, but the best results are obtained in land just on the stiff side. Lime is valuable. Cold draughty places should be avoided. Bulbs should be planted from 4–5 ins. deep; the lighter the soil the deeper the bulb. It is better to lift Tulips every year, but this is not absolutely necessary. Lifting should take place between 27th June and 7th July. The exact time is when the skin of the new bulb is just turning brown. Store in a cool airy shed or room away from the sun. Plant the smaller bulbs (offsets) in nursery beds in September, and the large bulbs in the first fortnight of November.

Indoor Tulip Culture. — Pot all varieties in September or early October in good light, rich soil. Darkened cold frames are to be preferred for the newly potted bulbs instead of plunging in the usual way. The young growth is tender and liable to be eaten by slugs and green fly, and to be effected when bruised with some kind of fungus. Darwin Tulips have been found to do well when brought on in gentle heat. The early forcing of Darwins should only be attempted by experienced cultivators.

Propagation.—The seed pods as they ripen are very subject to fungoid attacks. It is best to grow all plants for seed under glass as cool as possible. Seed should be sown in early autumn in pans or boxes, and these should be stood in a cold airy frame. Seedlings may remain in boxes for two years, when the small bulbs may be planted out in well-prepared beds of good *light* soil. Seed may be sown in rows in the open, but as a rule it is not advisable to do so. Propagation may also be effected by taking off all small bulbs from the large bulbs before planting, putting the biggest of these in beds by themselves in September and throwing away the very small bits.

Tulip Divisions.—For a detailed explanation the R.H.S. Tulip book should be consulted. The main divisions are (1) *Earlies*; (2) *May*

---

[1] Pure white or yellow bases are only to be found in English Florists' Tulips. In all other types the base is usually more or less coloured or stained.

flowering, sub-divided into Darwin and Cottage; (3) *Species* and (4) *Florists'*. These last are the "show" varieties, and as their cultivation is a very technical matter, specialists should always be consulted.

Varieties.—Selections from the Rembrandt sections are omitted, as they are not so much grown in average English gardens as the "Earlies" and "May flowering" varieties.

(*a*) *Single Earlies* for pots or bedding.—Artis, Brunhilde, Couleur Cardinal, Cottage Maid, De Wet, Jenny, Keizerskroon, Lady Boreel, Prince of Austria, Rose luisante, Vermillon Brillant, Van der Neer.

(*b*) *Cottage* for out of doors.—Boadicea, Ellen Wilmott, Gesneriana major, Goudvink, Inglescombe Pink, John Ruskin, La Merveille, Louis XIV., Moonlight, Mrs Moon, Mrs W. O. Wolseley, Orange King, Picotee, Rose Beauty.

(*c*) *Darwin's* for out of doors and for cool treatment in pots.—City of Haarlem, Clara Butt, Edmee Euterpe, Farncombe Sanders, Flambeau, Frans Hals, Faust, Margaret, Mauve Clair, Professor Francis Darwin, Pride of Haarlem, William Goldring, Valentin.

(*d*) *Early Doubles* for pots.—Couronne d'Or (orange and yellow); Couronne des Roses (rose); El Toreador (orange); Murillo (blush); Safrano (primrose); Schoonoord (white); Vuurbaak (scarlet).

(*e*) *Late Doubles.* — Blue Flag, Yellow Rose.

(*f*) *Good Florists' Varieties.* — Annie McGregor, Dr Hardy, Mabel, Samuel Barlow, Sir Joseph Paxton, Talisman.

(*g*) *Good Parrot Varieties.* — Amiral de Constantinople, Luteo major, Cramoisi Brillant.

(*h*) *Reliable Species* for out of doors.—Batalini, Dasystemon, galatica, Kaufmanniana, Marjoletti, Mauriana, persica, praestans, sprengeri, sylvestris.

DISEASES.

Fire Fungus.—A disfiguration of the flowers and foliage is frequently caused by a fungus called *Botrytis parasitica.* To avoid attacks, change of ground and annual lifting are advised. Cold draughty positions should be avoided. When the disfigurement is first noticed, excising all affected parts of the leaves with a sharp knife often prevents it spreading.

J. J. & E. T. E.

Up-to-date Selections.

Tulip Asturias.—Darwin. Purple and white.

T. Baron de Rothschild.—Yellow.

T. Bene Est.—Cream.

T. Bloodstone.—Cottage. Crimson and violet.

T. Bronzewing.—Red-bronze, gold-bronze, and blue.

T. Burgomaster de Vlugt.—Rose.

T. Captain Boyton.—A first-class kind.

T. Clos. de Vougeot.—Crimson.

T. Comedy. — Darwin. Pink, purple, and white.

T. Dipher.—Maroon and white.

T. Dorothy Ann.—Red and white.

T. Empire.—Cottage. Yellow.

T. Grey Dawn.—Grey, flushed rose.

T. Inglescombe Mauve.—Hybrid. Mauve and violet.

T. Inglescombe White.—Cottage. White.

T. Lady Ernle.—Orange-scarlet.

T. Lady Love.—Cottage and Darwin. Yellow.

T. Marconi.—Darwin. Purple and white.

T. Mars.—Scarlet-orange and yellow.

TUNBRIDGE FILMY FERN (*Hymenophyllum tunbridgense*). — See *Ferns and Fern Gardening.*

TUNICA (Nat. Ord. Caryophyllaceæ).—This is a genus of dwarf-growing hardy plants allied to Dianthus, mostly hardy herbaceous perennials, but containing two annuals of insufficient importance to be described here. The species we describe are suitable for use as edgings, and for forming of patches in mixed, rock, or perennial borders, and are useful rock plants. They need no special culture save a light sandy soil, and may be propagated by division of the roots, and planted successfully in mid-March. We recommend the following:—

Tunica illyrica.—This bears red flowers in July, and grows 6–9 ins. high.

T. rhodopea.—This bears pretty rose flowers in July, and averages 4–6 ins. high.

T. Saxifraga.—This is deservedly the most popular species of all with its charming pink flowers in July, on plants 6 ins. high. Various forms of it are offered by the trade, including a single and double white.

TUPELO (*Nyssa sylvatica*). — See *TREES.*

TURBAN RANUNCULUS.—See under TYPES AND VARIETIES in *RANUNCULUS.*

TURBITH (*Euphorbia Esula*).—See *EUPHORBIA.*

TURF.

When gardeners speak of turf they mean either of two materials. They may mean fresh, green, growing turf cut from the meadow, or they may mean half-rotted turf which is nearly but not quite far enough gone to be called loam. In this work we say definitely which kind of turf we mean, for it is confusing to gardeners, especially if they are young and are learners, not to know what is meant.

Fresh green turf is useful if it is chopped up for remaking of vine borders. But it must be covered over with soil. It can also be used for putting into the bottom of pots especially for bulbs, where little drainage is required.

Its chief use, however, is found for loam-making. For this purpose it is cut thin or thick to suit the fancy of the gardener or the circumstances of the case, and stacked, grass-side downwards, in a sloping heap for at least a year. The sods should be about 1 ft. square, and the heap should slope similarly to a haystack, the sloping sides being covered, as a roof is with slates, with large sods laid on afterwards when the heap has been built. This will help to throw much of the rain off. See also the article on *COMPOSTS.*

Half-rotted turf can also be used for the above purposes. It is an ingredient of many potting soils or composts, especially for strong-growing plants such as Chrysanthemums, Tomatoes, etc., which need some strength in their soil.

Half-rotted turf is freely used for putting over the drainage crocks in potting to prevent the drainage becoming clogged with particles of fine soil. For this purpose it should not be cut up too small, and should be rammed down very firmly.

E. T. E.

TURF CUTTERS.—See *GARDEN TOOLS.*

TURK'S CAP LILY (*Lilium Martagon*). See *LILIES*, and under LILY in *WATER GARDEN: PLANTS FOR THE.*

TURK'S CAP LILY: SCARLET (*Lilium chalcedonicum*).—See *LILIES.*

TURK'S CAP LILY: YELLOW (*Lilium pyrenaicum*).—See *LILIES.*

TURKEY DUNG. — See *POULTRY MANURE.*

TURKEY OAK (*Quercus Cerris*).—See *TREES.*

TURKEY WHEAT (*Zea Mays*).—See *ZEA.*

TURKEY'S BEARD. — See *XEROPHYLLUM.*

TURNIP BEET.—The same as TURNIP-ROOTED BEET.

TURNIP CABBAGE.—This is a name sometimes given to *KOHL RABI,* which see.

TURNIP AND CABBAGE GALL WEEVILS.—See *INSECT PESTS.*

TURNIP FLEA BEETLES. — See *INSECT PESTS.*

TURNIP LEAF MINER.—See *INSECT PESTS.*

TURNIP MOTH.—See under SURFACE LARVÆ in *INSECT PESTS.*

TURNIP RADISH.—A variety of RADISH. See *RADISH.*

TURNIP-ROOTED BEET.—See *BEETROOT.*

TURNIP-ROOTED CHERVIL. — See *PARSNIP-ROOTED CHERVIL.*

TURNIP-ROOTED CROPS. — See *KINDS OF CROPS.*

TURNIPS (*Brassica Rapa.* Nat. Ord. Cruciferæ). — Although of easy culture, these well repay generous treatment, the quality of roots grown with care in a garden being altogether superior to others of the same variety grown under field cultivation, or where a slipshod method only is followed.

Culture. — Rapid growth is the secret of obtaining sweet, juicy turnips, and to ensure this, not only must plenty of manure be added to the soil, but this must be finely broken up, and the surface raked down very level.

Seed may be sown any time from early spring until the first week in September. The latter sowing will provide a good supply of roots all the winter, and if left in the ground instead of storing in pits or sheds, will throw an abundance of delicious green early the following spring.

The rows may be from 8–12 ins. apart, the latter only where the ground is very rich and bulbs of large size wished for.

Avoid making the seed drills too deep, since the seed needs a very slight covering of fine soil. Should a warm shower follow the sowing, the young plants may usually be seen through the soil in less than a week. Thin out to 4 ins. apart as soon as the plants show the rough or true leaf, and dust them over with old soot freely to check the Turnip Fly. Use the hoe very frequently between the rows, and whenever possible give a sprinkle of one of the better known artificial manures just previous to a storm. By the time the plants fairly touch each other, most will have formed a root of small but useful size. Each alternate plant may then be withdrawn, allowing those remaining a clear 8 ins., which distance invariably produces roots of the most acceptable size.

Large sowings are rarely advisable, the quality of the roots deteriorating after a certain stage is reached; and where good quality is the chief consideration we advise a small sowing to be made every fortnight from May until August, the sowing made at the latter date being a much larger one to provide roots for the winter supply.

When making sowings during the hottest weeks of the summer, pour water freely along the drills a short time before sowing the seed; and as soon as the little seedlings appear, sprinkle short grass or chaff over the tops to protect them from the Turnip Fly, which in some seasons ruins whole sowings where this or other precautions are neglected.

Varieties.—The following are excellent: — All the Year Round, Carter's Jersey Lily, Chirk Castle, Early Frame, Early Snowball, Green Top, Manchester Market, Red Globe. *All the Year Round, Chirk*

Castle, and *Orange Jelly* are the most suitable for sowing for winter use, and, being very hardy, may be left in the ground all the winter without harm, in a season when many others would be ruined.

F. R. C.

TURQUOISE BERRIED VINE (*Vitis heterophylla humulifolia*). — See *CLIMBING AND TRAILING PLANTS.*

TURRITES.—Now included in the genus *ARABIS.*

TUSSILAGO (Nat. Ord. Compositæ).—Five species previously included in this genus are now referred to *PETASITES,* on which genus we devote a separate article. The remaining species grown at Kew (*Tussilago Farfara*) is the COLTSFOOT, a perennial weed spreading by thick whitish underground stems, quite unworthy of cultivation save for medicinal purposes. See articles on *MEDICINAL HERBS* and *WEEDS.*

TUSSOCK GRASS (*Deschampsia caespitosa*).—See *DESCHAMPSIA.*

TUTSAN (*Hypericum Androsaemum* and *H. calycinum*).—See *SHRUBS.*

TWAY-BLADE (*Listera ovata*).—See note at end of article on *HARDY ORCHIDS.*

TWIN FLOWER.—See *LINNAEA.*

TWINING BERCHEMIA (*Berchemia volubilis*). — See *CLIMBING AND TRAILING PLANTS.*

TWITCH and TWITCH-GRASS.—See under BENT GRASS and COUCH GRASS in *WEEDS*; see also *AGROPYRON.*

TYLENCHUS. — See EELWORMS in *INSECT PESTS.*

TYPHA (Nat. Ord. Typhaceæ).

This is an unimportant genus of bullrushes and allied plants, more suitable for the wetter portions of the wild garden than for anywhere else.

T. angustifolia is the SMALL BULLRUSH, while *T. latifolia* is the better known REEDMACE described under this name in our article on *WATER GARDEN: PLANTS FOR THE. T. Laxmanni* and *T. stenophylla* are other species which may be grown when space and circumstances admit. All bear brownish spikes of bloom in July each year, and average 3–6 ft. in height.

TYPHAENA.—See under SURFACE LARVÆ in *INSECT PESTS.*

U

ULEX.—For the best species of this see *SHRUBS.*

ULMUS.—For the best species see *TREES.*

UMBELLIFEROUS CROPS.—See *KINDS OF CROPS.*

UMBILICUS.—Now included in the genus *COTYLEDON.*

UMBRELLA OF ST. JULIEN (*Populus tremuloides pendula*).—See *TREES.*

UMBRELLA PINE (*Pinus Pinea* and *Sciadopitys verticillata*).—See *TREES.*

UMBRELLA TREE (*Magnolia tripetala*).—See *CLIMBING AND TRAILING PLANTS* and *TREES.*

UNHEATED GREENHOUSE. — See *GREENHOUSE: COLD AND UNHEATED.*

UNICORN PLANT.

This, belonging to the genus *Martynia*, bears edible pods used in pickling. It is a climbing or trailing plant with yellow flowers, requiring greenhouse treatment, and is not greatly recommended for general culture.

UNIT VALUES. — See *ARITHMETIC AND GARDENING.*

UPRIGHT CROWFOOT.—See under *Ranunculus acris* in *RANUNCULUS: PERENNIAL BORDER SPECIES.*

URCHIN OF THE WOODS. — See EDIBLE FUNGI in *FUNGI: EDIBLE AND HARMFUL.*

UREDO STAGE.—See *RUST FUNGI.*

URINE: ITS USE IN THE GARDEN.

Gardeners do not realise as they ought to the immense value of human urine in the garden. In its fresh state the results gained from its use are often very disappointing, but after it has fermented for a few days, the food it contains becomes altered and much more valuable for plants.

In the limited cases where urine is used, it is the truth to say it is used the wrong way. Instead of the gardener making arrangements with the servants to save the urine and keep it separately for him, he goes down to the cesspool and pumps the liquid up to the garden again. Cesspool liquid (especially where the family is large and there are constant baths), is usually very poor, but in some cases it is wholly undesirable on account of the soapy matter it contains. Soap suds and human urine are not a good mixture, and frequently turn the soil sour.

The gardener should arrange that all urine made in children's nurseries and in the bedrooms be saved for him, and emptied into one of three barrels daily during the summer months. Thus a constant supply of fermented urine will be available, and the problem of not being able to get drainings from cow-sheds and pig-stys for making into liquid manure will be solved.

The barrels of urine should be out of sight. This can be managed by putting them behind a group of tall shrubs. But they must, nevertheless, be easy of access and in a convenient spot, since everything which can be done should be done to avoid unnecessary extra labour.

When required for use, a can should be dipped into one of the barrels and this should be filled about one-fifth of its capacity with the fermented urine. The can is then filled up with water. This is, generally speaking, a safe liquid manure for strong-growing crops, but as the strength of human urine is apt to vary somewhat according to diet, health condition of its producer, and period of its passage, it is well to test the diluted liquid first by pouring some over the foliage of large-leaved weeds. If it should burn them, it is too strong, and should again be diluted. This liquid is splendid for such gross feeding crops as leeks and onions, also celery, all of which will stand a lot of feeding. This liquid may also be used, as mentioned just now, as a general liquid manure.

If the barrels should smell badly, it will be necessary to mix a small quantity of sulphuric acid with their contents, and this should stop the trouble.

Urine can be used in another way besides the one given above. Mixed with twice its own volume of water, it is a grand liquid for pouring over heaps of vegetable refuse which the gardener desires to enrich and hasten in decomposition. This subject is dealt with more fully in the article on *Vegetable Matter*, which see.

E.

URTICA (Nat. Ord. Urticaceæ). The several species in this genus of hardy herbaceous and spreading perennial plants are quite unworthy of cultivation. *U. dioica* is the well-known Stinging Nettle, a most troublesome weed, the young shoots of which may be eaten as spinach or made into nettle-beer. See article on *Weeds*.

USEFUL TOP-DRESSINGS.—See *Top-dressing*.

USES OF BAMBOOS.—See *Bamboos*.

USES OF HEATHS.—See *Heaths*.

UVULARIA (Bellwort. Nat. Ord. Liliaceæ).—This is a small and unimportant genus of hardy herbaceous perennials, six out of its nine usually grown species now being included in other genera. Of the remaining three, *U. grandiflora* bears purplish flowers, and grows 1 ft. high; while *U. perfoliata* and *U. sessilifolia* both bear yellow flowers and only grow half that height. All three species bloom in May and respond to ordinary border or rock border culture in light loam. They are best propagated by division of the roots in mid-March, which also is a good time to plant.

V

VACCARIA.—Now included in the genus *SAPONARIA.*

VACCINIUM.—For the best species see *SHRUBS.*

VACUUM BOTTLES. — These are used in FRUIT BOTTLING. See *FRUIT BOTTLING AND PRESERVING.*

VALERIAN (*Centranthus angustifolius* and *C. ruber.* Nat. Ord. Valerianaceæ). — This well-known wall garden, rock garden, wild garden, and perennial border plant must be distinguished from the GREEK VALERIAN (*Polemonium caeruleum*). It is quite distinct and belongs to a totally different Natural Order, in addition to which it is about as unlike a Phlox as a Dahlia is different from a Snapdragon. It is wanted as a drug, and is said to be so nasty that when a leaf is chewed melancholia is driven away to such an extent that one feels fit to jump over the moon with exuberance.[1] Sprays of the flowers are useful for cutting, and prove very showy in vases or bouquets.

Culture.—This is of the easiest. If left to itself the plant quickly seeds, and hundreds of young plants appear all round it. This is very desirable in the wild garden and on the wall garden, but in the herbaceous border care must be taken to remove the dead flower-heads immediately they are formed to keep the plants from spreading. Any ordinary garden soil and almost any position, though very preferably a dry, hot sunny and limy site, is suitable. Propagation is simple. The fleshy roots may be divided and replanted, or abundant stock may, as already mentioned, be raised from seed. Planting can be done from November to late March, at which time also division is successful. Seed may be sown in the spring or summer in the usual way, burying it lightly in ordinary sandy compost.

What to Grow.—Omitting the annuals, which are not often known as Valerians, and which are now but little grown and of small consequence, we recommend the following :—

Centranthus angustifolius. — This is a dark red or crimson free flowering sort blooming from the early summer onwards into July. Its height is about 2 ft.

C. ruber.—This is a brilliant red sort flowering for three months from June onwards. At times it will reach 1 yd. in height, but more usually it does not exceed 2 ft.

C. ruber albus.—This white variety is not nearly so attractive as the one above, though it blooms as freely and at the same time. It averages about 18 ins. in height.

C. ruber flore-albus. — This is *C. ruber albus* under another name, and is neither a distinct variety nor a species.

VALERIANA (Nat. Ord. Valerianaceæ).—This genus of plants is quite distinct from that described in our article on *VALERIAN*, although sometimes known by the same English name. It is a large but not very important family of hardy herbaceous perennials of which the dwarfer sorts may be used in the rock garden. *V. officinalis* is described under VALERIAN in our article on *MEDICINAL HERBS*, and our own medical man informs us he has prescribed it with very satisfactory results in cases of hysteria, especially in young girls. Valerian tonic is one of the worst-tasting medicines in the Pharmacopœia.

---

[1] We cannot vouch for the accuracy of this statement !—EDITOR.

Culture.—The medicinal culture is fully described in the article mentioned above. Garden culture is not a matter of any difficulty. Ordinary garden soil and warm dry sunny situations suit the plants admirably. Propagation by seeds at the usual time (summer), and by root division in the autumn or spring, is quite an easy matter, and success may be anticipated and attained by planting in March.

What to Grow.—Only a few of the very numerous species can be described here; for others, larger works must be consulted:—

Valeriana alliariaefolia.—This is a red sort blooming from June onwards, and growing 1½ ft. in height.

V. globulariaefolia is similar but only 1 ft. high.

V. officinalis.—This, popularly known as Valerian, or Cat's Valerian, is fully described, as already mentioned, in our article on *Medicinal Herbs.*

V. Phu (Cretan Spikenard).—This is a useful white sort blooming from July to August, and growing about 1 yd. in height. The yellow-leaved variety *V. P. aurea* is used for spring bedding.

V. pyrenaica (Capon's-tail Grass).—This is a pretty pink species flowering from August to September, and growing 2–3 ft. in height.

V. supina.—There are both white and red forms of this July blooming species, which only grows 6 ins. in height.

VALERIANELLA (Nat. Ord. (Valerianaceæ).—This is an unimportant genus of hardy annuals of little value for garden decoration. The best known species is *V. olitoria,* the Corn Salad or Lamb's Lettuce, the culture of which will be found described under the former name in our article on *Salad Plants.*

VALLEY OAK (*Quercus lobata*).—See *Trees.*

VALLOTA.—See *Scarborough Lily.*

VALONIA OAK (*Quercus Aegilops*).—See *Trees.*

VALORDIA.—Now included in the genus *Ceratostigma.*

VALUATION OF MANURES.—See *Manures.*

VALUE OF ALLOTMENT SOCIETIES. See *Allotment Organisations: Their Value and Purpose.*

VALUE OF ASHES.—See *Ashes Their Value in the Garden.*

VANCOUVERIA (Columbian Barrenwort. Nat. Ord. Berberidaceæ).—Only one species is known. This succeeds in shady situations, and is propagated by division of the roots in autumn or spring.

Vancouveria hexandra.[1]—A sort with elegant Thalictrum-like foliage. Flowers white, in panicles. Site, shade. Soil rich gritty peat. Flowering Period, May to June. Height, 9 ins.

VANDA.—See *Orchids.*

VANILLA.—See *Orchids.*

VAPOURER MOTH.—See *Insect Pests.*

VARIABLE BUDDLEIA (*Buddleia variabilis*).—See *Climbing and Trailing Plants.*

VARIEGATED GROUND IVY (*Nepeta Glechoma variegata*).—See *Catmint.*

VARIEGATED MAIZE (*Zea Mays variegata*).—See *Ornamental Grasses.*

VARIEGATED TREE MALLOW (*Lavatera arborea variegata.* Nat. Ord. Malvaceæ).—Seeds of this pretty biennial should be sown in a cold frame in April, the seedlings being transplanted and put out in

---

[1] This is the Barrenwort of Kew.—Editor.

May; or seed may be sown outdoors at that time. The first method gives the largest plants, which have a striking sub-tropical appearance. The leaves are handsomely splashed with white. The purple flowers are produced on branching stems, 3–6 ft. high, from July to September in the second year. For other species of Mallow see articles on *LAVATERA* and *MALVA*, while for FALSE MALLOW see article on *MALVASTRUM*.

VASES.—See *GARDEN FURNITURE*.

VEGETABLE BOTTLING.

Experience has shown that vegetable bottling is not so easy as fruit bottling, and since vegetables contain different bacteria from fruits, different treatment and greater heat is required if they are to be successfully bottled. A difficult problem to solve is the retaining of the natural colour, and this can be done in the case of white vegetables such as Artichokes and Celery by exposing them to the fumes of burning sulphur, or in the case of Peas and Beans by the addition of a little carbonate of soda and borax. All vegetables must be bottled in vacuum jars, for it has been proved that jars with bladder or paper tops are quite unsatisfactory.

Below we give a few particulars of some of the ways of bottling.

Peas and Beans.—Shell the peas and have ready a saucepan of boiling water with a pinch of salt and a sprig of mint added. Boil the peas in this for two minutes, pouring straight into a colander and cool in cold water. Pack the peas tightly into bottles, filling to overflowing with the following mixture previously prepared and allowed to go cold:—

Boiling Water .	. 2 pints.
Powdered Borax	. 2 teaspoonfuls.
Common Salt .	. 1 teaspoonful.
Carbonate of Soda	. 1 teaspoonful.

Put on the glass lids and screw the metal tops down loosely, avoiding putting on the rubber bands. Place the bottles on a false bottom in a deep pan and fill up with cold water in the usual way. Bring to the boil and continue boiling for forty-five minutes without ceasing. Take each bottle out separately, unscrew the top and put the rubber band in position after dipping it into boiling water. Screw down the lid immediately, and allow to go cold. Next day loosen the metal screw slightly, and place the bottles in a pan of cold water, boiling them again for forty-five minutes and treating them as before. Repeat the process a third time, and if any liquid has boiled out of the jars, fill up each with boiling water from the kettle. The rubber bands are best removed during each sterilising. Broad Beans and French Beans are preserved in the same way, and this method is known as "intermittent sterilising."

Other Vegetables.—Nearly all other vegetables do not require sterilising more than on one day, and the bottles of these should be filled up with brine when cold, made of one pint of boiling water and one teaspoonful of salt. The lids are screwed down loosely without the ring in the usual way, but boiling for one and three-quarter hours is necessary. In the case of Carrots and Marrows it is often necessary to refill the bottles with boiling brine after the one and three-quarter hours' boiling in a pan.

Preparation for Bottling:—ASPARAGUS.—None but that absolutely fresh should be used, and, of course, sticks of even size and of the length of the bottles should be selected. Wash them and pack them head upwards, using the same mixture recommended for Peas if the colour is to be kept.

Carrots.—Young roots of these bottle well. First scrub them and boil for a few minutes, after which the skins are easily removed. Cut either into even lengths or rounds, and pack tightly into bottles; then proceed in the usual way.

Celery.—This may be preserved similarly to Seakale. (See below.)

Leeks.—Well-blanched, straight-stemmed leeks not too large are the best. Clean them thoroughly, cut them to fit the bottle, and pack tightly, after which proceed in the usual way.

Marrows.—First peel these, removing the pithy part with the seeds, and cut into even pieces to fit the bottle. Pack tightly until quite full, after which proceed in the usual way.

Seakale.—Nice heads of this should be selected and, after thorough washing, cut into even lengths with the heads up, and pack tightly into the bottles. Fill up as usual with brine, and sterilise, adding a lump of sugar if a good colour is wanted.

Runner Beans in Salt.—This is another form of preserving, and is useful for large quantities of Beans. Stone jars of good size are the best, and after washing these a good layer of common salt is put in. The beans must be gathered before they grow tough, and be topped and tailed, after which they are laid flat on the salt in alternate layers. A thorough sprinkling of each layer of beans with salt is advisable, as also is a layer 1 in. thick on the top of the bottles. The beans may be sliced before putting in salt, if small jars must be used, and prior to use should be well soaked in cold water.

It may be pointed out in conclusion that vegetables preserved in vacuum jars should be tested twenty-four hours after bottling in the same manner as should fruit. (See article on *Fruit Bottling and Preserving.*) All bottles should be stored in a dry place away from strong light.

Time Required.—We give below the minimum times required for sterilising vegetables:—

Artichokes . . .	1¾ hours.
Asparagus . . .	Intermittent.[1]
Beetroot . . .	1 hour.
Broad Beans . .	Intermittent.
Carrots . . .	2 hours.
Celery . . .	1¾ hours.
Dwarf Beans . .	Intermittent.
Leeks . . .	1¾ hours.
Marrows . . .	1¾ hours.
Peas . . .	Intermittent.
Runner Beans . .	Intermittent.
Seakale . . .	1¾ hours.

E. C.

VEGETABLE CAMELS. — A name applied to cactaceous plants. See *Cacti.*

VEGETABLE CULTURE IN CITIES.—See *Town and City Gardening.*

VEGETABLE MANURE.—See under General Manures in *Manures.* See also *Leaves, Peat, Seaweed as Manure, Vegetable Matter,* etc.

VEGETABLE MARROWS (*Cucurbita Pepo ovifera.* Nat. Ord. Cucurbitaceæ).—These usually prove a very welcome crop, and have the advantage of growing and fruiting in parts of the garden where many other vegetables fail.

They are distinct both in nature of growth, also in formation and colour of the fruits, while the fact that many fully grown specimens of some varieties each year are found to turn the scale at 60 lb. or more, while other fully grown fruits of another variety may not be above 5 lb. or 6 lb., shows the diversity of size and weight.

The long fruiting, trailing varieties enjoy the greatest popularity among private growers, and certainly the small grower, having an ugly fence or building, or anything objectionable, to cover cheaply and quickly, could hardly find anything better than this; but where nothing of this kind exists, and the call upon these as a vegetable is not likely to be a very frequent one, the Bush variety, so largely grown by market gardeners, is then more likely to give satisfaction.

---

[1] Intermittent sterilising signifies that more than one sterilising is required. All the vegetables marked in this way above should be sterilised for forty-five minutes up to a heat of 212° F., on three successive days.—Editor.

Culture.—To provide fruit early in July, sow seeds the first week in April, and give the plants the protection of frame or greenhouse till May. For all ordinary purposes, the seed may be sown in the open air any time during May. (Late May is soon enough in cold, exposed, northern districts.—EDITOR.)

A good, rich rooting medium is at all times desirable, but it is quite unnecessary to go to the trouble of making the huge manure-beds one frequently sees in or near farmyards, which, although favouring the production of tremendous leaves, invariably give less weight and less fruit than is taken from plants where only a moderate quantity of manure is provided. We have found the best way is to prepare a trench exactly as advised for celery, allowing it to be a foot or more wider, and in this plant the seeds two or three together about a yard apart. Should more than one germinate, remove all but the strongest at once, and encourage a rapid growth by frequent waterings with tepid or rain water. If a long succession of fruit is desired, keep the plants in vigorous health by repeated applications of manure water, and cut all fruits before the skin becomes too hard to be easily pierced with the thumb nail.

Where huge fruits are more desirable than a larger number of others of moderate size, two or three should be selected as soon as "set" in July, and all others removed at once, the point of the shoots being taken out at the third leaf beyond the selected fruit. If these fruits are allowed to rest on pots or boxes high above the leaves of the plants, they will grow more rapidly than if covered by the huge foliage, and the ripened stage will be reached earlier in the autumn.

In addition to liquid manure, plants expected to give these large fruits should be liberally fed with one of the advertised patent manures, increasing the quantity as the specimens develop.

Varieties.—Splendid sorts for table include:—Custard, Hibbert's Prolific, Moore's Cream, Pen-y-byd, Perfection, and The Sutton.

For Large Size.—Carter Page's Mammoth, Long Green, Long White.

F. R. C.

UP-TO-DATE SELECTIONS.

Improved Green Bush.—A splendid early sort.

Long Cream.—Attains great length.

Long White.—First-class size and flavour.

Table Dainty.—A heavy-yielding early.

White Bush. — Creamy-white, heavy yielder.

First of All.—A fine early form.

Long White.—A very early marrow.

Perfection.—Very fine flavour.

Tremendous Green. — Attains exceptional size.

White Bush.—First-class earlyform

Long White Bush.—One of the very best.

Model Cream.—Very heavy yielder.

See also *CUCURBITA* and *ORNAMENTAL VEGETABLES*. For METHOD OF BOTTLING see *VEGETABLE BOTTLING*.

VEGETABLE MATTER.

Not very long ago the present writer read an article on "Green

Manuring in the Garden." This article, he was amused to see, confused hopelessly two different subjects, namely, Green Manuring and Vegetable Manuring. The former, as is clearly stated in the article on the subject in the earlier part of the Dictionary, is concerned only with digging fresh green live growing crops into the soil. Vegetable manuring, on the other hand, means digging into the soil rotted vegetable matter (which is not green at all); using this vegetable matter with or without artificial fertilisers. Thus gardeners should clearly distinguish between the two. True Green Manuring is highly valuable, but this is dealt with in a separate article.

Vegetable Matter is a comprehensive term embracing as it does all soft easily rottable garden rubbish. Leaves are also included, but most people prefer to save them separately, since they make valuable mould. (See *Leaves, Gathering, Storing, and Using.*) It embraces everything that is desirable and capable of rotting into humus, from weeds and cabbage leaves to dead stems of flowering plants. Clippings of shrubs and hedges, prunings from roses and fruit trees, also dangerous weeds such as nettles, dandelions, docks, goosefoot, coltsfoot, trefoil, twitch, buttercup, wild strawberry, ground ivy, etc., must not be considered as Vegetable Matter—these materials form what is more properly termed garden rubbish, and should be disposed of as described in the article *Burning Garden Rubbish.*

Vegetable Matter consists, then, of all soft, clean, valuable, rottable plant remains. Vegetable Manuring consists, first, of turning the vegetable matter into rich manure; and secondly, of the application of this manure to the crops and flowers. It is necessary to change it into manure first of all, since green rubbish which has been lying about for some time is not good, and usually contains many pests. When selecting material it is well to see that there is no fungoid disease on any of it, and for this reason potato haulm should never be used, as it nearly always carries spores of the ordinary potato disease (*Phytophthora infestans*), and frequently carries something worse as well.

To change vegetable matter into manure is sometimes no easy task, especially if the weather turns very hot indeed. We think that the quicker the first decomposition is within reason the better. The only thing to be guarded against is what is technically known among horticulturists as "foul fermentation." If this sets in the material becomes burning hot and turns white and mildewy. Animal manure is addicted to this dry rotting or dry heating as well as vegetable manure, and the remedy is to turn over the heap at once, shaking the matter well out to let off some of the rank gases, water very thoroughly, and then make the material into a very firm stack again.

There are several different ways of turning the vegetable matter into manure. A popular way is to make a stack above the ground and cover it with soil, letting the material remain undisturbed for a year. This, however, is not one of the best methods, but it has to be adopted if the water-level is near the surface. We consider the very best way is to have a large rectangular pit dug, some 6–10 ft. deep and the sides and bottom bricked or concreted. At the bottom of the pit there should be a grating leading to a small and still deeper hole. A pump should be connected with this latter hole, and periodically the liquid should be sprayed on to one of the upper layers of material in the pit. This hastens its decay and greatly improves the quality of the manure. As the material is thrown in it should be sprayed with water, liquid manure, or, better still, urine from children's nurseries, bedrooms, etc. This will help it to decay and will also improve it greatly. The material should be trodden firm. It may be necessary to use gypsum to absorb ammonia, or chloride of lime to prevent unpleasant smell, but as little as will suffice should be used.

Unless the pit is of very large size it will become full long before the end of the season. This being the case its emptying becomes a matter of prime necessity. When the material is turned out, the top foot depth or so should be kept separate as it will not have decayed at all or only just have started. The rotted material should be well shaken out and mixed together, after which it should be built into a firm stack above ground, beaten hard, and covered with soil until required for use.

Some gardeners have what is called an "open bed" for the making of this vegetable manure. This is really a shallow hole. The material is thrown in and piled up. After about a fortnight these gardeners turn the whole lot of the material over and mix it together, thereby exposing a fresh surface to the drying action of the sun and wind. We consider this to be a great mistake, but, of course, it is absolutely necessary if the thermometer shows that the material has started to heat violently. If, however, the thermometer (which should always be stuck in the centre of any heap or pit of animal or vegetable matter which is rotting) does not show any undue rise of the temperature, the material should be left alone to decompose in its own way, thus saving time, worry, and trouble.

And now just a few words must be said about using the vegetable manure we have just made. If it is pure and simple rotted vegetable matter, and even if it is made with urine, it is much milder than the best farmyard manure. Thus it can be used in a larger quantity. We prefer to allow it to remain in the pit three months and then in the stack another six months, after which it is mild and harmless, though even so it is quite rich. About 4–5 cwt. per sq. rod of land can be used; a little less in the case of flowers perhaps, and a little more for the strongest vegetables. It can be dug into flower borders in the autumn, winter, or spring; it can be dug into the borders immediately prior to putting down summer or winter bedding; or, mixed with a small quantity of leaf-mould and rubbed through a half-inch riddle, it makes an ideal top-dressing for lawns, the grass of which is of poor quality. In the vegetable garden the first use of the fresher material which occurs to us is, as manure for celery and leek trenches, instead of animal dung. In the summer it can be dug in shallow, and surface-rooting crops sown on the land. In the winter it can be freely used in the trenching. It is not adaptable as is stable or cow dung as a mulch. For roses it is splendid, and good results have been attained by using equal parts of this and dung when making up borders for indoor fruits. These few remarks will serve to show how very useful vegetable matter is, and hence gardeners are urged not to burn the useful matter on the fire, which process is wasteful, but to keep it separate from the other matter and use it as manure.—E.

VEGETABLE OYSTER. — A name applied to *SALSAFY.*

VEGETABLES : BLANCHING AND FORCING.—In catalogues of vegetables are a number which, to produce at perfection, require treatment, for a greater or lesser time, by blanching. This period, during which the plants are shut away from light, acts in two ways: firstly, forcing artificial growth, whereby a succulent and palatable product results; and secondly, blanching, by robbing the growths of the effects of colouring matter, and thus lessening a certain bitterness or high flavour appertaining to the healthy green natural growth, which renders the edible portion very much more suitable for table use.

There are, in different countries, many methods employed for blanching, especially amongst those clever gardeners of China and Japan, but as these items do not yet affect our daily menu here, it is only proposed to deal with the forms to be found in use in most gardens in this country.

Blanching is really only a method of forcing as exemplified in the case of the Leek, where the endeavour of the plant to reach light, when this is excluded, produces a length of blanched stem succulent and delicious in flavour. The principal vegetables we have to consider are Cardoons, Celery, Chicory, Dandelion, Endive, Leeks, Mushrooms, Rhubarb, and Seakale.

Cardoons. — On the Continent these are more largely grown than here, and we do not know them so well as we should, for they are very useful in giving a change of vegetable during autumn and winter. The most satisfactory way of growing is like Celery, in trenches prepared about the end of March or beginning of April. To blanch, use brown paper, commencing about eight to ten weeks before required for the table, and use in addition hay-bands for protection purposes. Wind a strip of the paper, about 6 ins. wide, round the plant, first securing the leaves together by tying with raffia at the top, also securing the plant itself to a stout stake. Round the brown paper wind a hay-band, and earth up. Repeat in about ten days until the operation is finished. If sharp frosts threaten, protect the whole with straw or bracken. See also paragraph on *CARDOONS* in body of work.

Celery.—The blanching of this vegetable can be done in two ways. Early supplies, grown on the flat, can be blanched by tying up in brown paper wrappings, using moderately stiff paper in bands about 5 ins. in width, fastened round the plants with two or three secure ties of raffia. Draw the soil round the base, and, at intervals of about ten days, add further bands until within about 6 ins. of the growth.

For winter supplies, earthing-up is necessary. The day before doing this, give the plants a good soaking with water. Break the soil up finely before putting round the plants, and one worker should do the earthing-up whilst another should hold the growths compactly together, to keep the soil from working in. Remove any side-growths before earthing-up. Moulding-up should be done in stages, putting about 6 ins. of soil round at a time, and allowing about ten days to elapse before repeating. The Celery planted out for very late supplies should not be earthed up until the autumn is well advanced, as it will then prove more frost-resistant. If severe frost threatens, cover over the top and ridges with straw, bracken, or similar material. See also article on *CELERY.*

Chicory.—This is a useful winter and spring salad medium, though some like it boiled as a vegetable. Its general culture is dealt with elsewhere in our article on *Salad Plants*. To force it, lift some of the plants in the open ground about three weeks before they are wanted for use, remove the foliage just above the crowns, planting closely together in a box, and cover over with fairly moist fine soil. Stand in a cool, frost-proof cellar, or similar place, from which light is excluded, give an occasional syringing with tepid water, and a good quantity of blanched leaves for salads will be obtained, which are most useful when Endive and Lettuce are very scarce. The other plants can be lifted and similarly treated to maintain supplies.

Dandelion.—Another useful salad material, of which there are now varieties improved over the common field type for garden growing. It should be raised in the same way as Chicory, and at the same time. For winter use lift as required, and blanch in the way recommended for Chicory. For spring use it can be blanched where it grows by placing sufficiently large pots over the plants. See also article on *Salad Plants*.

Endive.—A member of the same family as Chicory, and even more useful for salads. There are two forms, the Batavian or large-leaved, and the curled. The general culture is described elsewhere in our article on *Endive*, but in the present article we are concerned with its blanching.

To do this thoroughly for table use, in order to lessen the bitterness of its flavour, in summer and autumn we can effectively accomplish it by tying the leaves loosely together, taking care to leave sufficient room for the young leaves to grow; also it can be done by placing a large pot over the plant, with the drainage vent closed. The most satisfactory plan to blanch in winter is to lift a few plants at intervals, sufficient to meet requirements, and place in a cellar or similar dark place.

Leeks.—These are best raised in the manner described in the separate article on *Leeks*.

Growing in trenches, similar to those advocated for Celery, is the way to obtain the best results, though where this cannot be done they may be grown on the flat, or in holes bored with an iron bar.

Blanching must be proceeded with from the time the plants are first put out. Brown paper tubes, about 6 ins. in length, are best for this work, and should be placed round each plant, and a little soil drawn about the bottom to keep it in position, using also two small sticks to give support to the tube. Examine the plants every week or so, and as they draw up, raise the tube, replacing it with a quantity of soil round the exposed portion of the blanched stem, until about 12–15 ins. of blanch is attained.

Mushrooms.—Although, strictly speaking, blanching is hardly done in the case of Mushrooms, it is necessary to include them in these notes, as undoubtedly the best results are obtained by growing in the darkness of a cellar or mushroom-house, owing to the atmosphere remaining more moist and of more equable temperature. (See article on *Mushrooms*.—Editor.)

Rhubarb.—Forcing Rhubarb is essential to obtain early supplies. The plants should have two seasons' growth prior to forcing, and early varieties only must be selected for earliest supplies. When the leaves die down in autumn, lift the stools and place under a north wall for about a fortnight, covered by straw, litter, etc., then place in the warmest end of a mushroom-house, a warm pit, or a cellar, with sufficient soil round the roots to cover them. Two or three batches can be forced in this manner for carrying on the supply, and after these are finished, cover over some of the stools in the open with pots, or tubs, of sufficient size, and place over and around these, leaves which are starting to decay, or similar material, to raise the temperature to about 55° F. See also our article on *RHUBARB*.

Seakale.—The forcing and blanching of Seakale may be commenced about the middle of November. Select as far as possible plants of two years' growth for this purpose, and invert a seakale-pot over each group of crowns, first clearing the ground of rubbish and placing a good mound of ashes over the crowns; also lightly fork over the surface of the ground. Over the pots should be put good leaves, in order to raise the temperature to 50–55° F. as the leaves begin to decay and ferment. It is necessary to keep out light and air, but, as the weather gets warmer and the season advances, less leaves will be necessary.

Latest supplies from permanent beds (see article on *SEAKALE*) should be ridged over with light soil, ashes, or both mixed, and as the growths aim to reach light and air, they will be ready for cutting when the ridge material shows signs of cracking owing to the shoots starting to grow out. If necessary to cut before required, Seakale will keep for some time stood in a little water in a cool dark place.

When the forced crowns are cleared, they should be covered with ashes, the ground surrounding them being first dressed with manure and this forked in.

Another satisfactory way of forcing Seakale is to lift the crowns at intervals as required, and place them in the warmest end of the mushroom-house or cellar. Syringe the crowns occasionally, and keep perfectly dark. This may be practised all through the winter months.—ED. B.

VEGETABLES: DISEASES OF.—The articles containing notes on the various vegetable diseases are referred to in *VEGETABLES: GENERAL CONSIDERATIONS.*

VEGETABLES: DRYING OF.—See *DRYING OF FRUITS AND VEGETABLES.*

VEGETABLES: EXHIBITION CULTURE OF.—See *EXHIBITION VEGETABLES.*

VEGETABLES FOR THE VERIEST AMATEUR.—See *GARDENING FOR THE VERIEST AMATEUR.*

VEGETABLES: GENERAL CONSIDERATIONS.—Vegetable gardening is of such enormous importance that we feel that a special article on General Considerations must be included, although separate articles on almost all known vegetables have been already given.

Selection of Site.—More importance should be given to this than has been done in the past. Previously it was the opinion of garden designers that the best part of the garden should be kept for flowers. An inferior site, often not fully exposed to the sun, was considered good enough for the vegetable garden. There were sometimes, too, other disadvantages. The site was on a slope, and thus difficult to work; or the soil was thin and poor. The present writer, who has grown food during the war and for a lengthy period prior to the war, is of the opinion that the best possible position should be selected for the vegetable garden, as vegetables are in many cases of greater importance than flowers.

Thus the site for the vegetable garden should be in as open a spot as possible, away from trees, and certainly not on a steep slope. The soil should, in the ideal vegetable garden, be a rich loam, and should be at least 2 ft. deep. It should rest on a semi-pervious bed, such as chalk marl, since neither an easily drained sand nor a stiff clay subsoil is ideal for working. However, if the site is not ideal in this respect, it will be necessary to improve the soil in the manner afterwards described.

Soils and Manures.—The opinions of vegetable gardeners are divided as to whether a light or a strong soil is the better for vegetable gardening. The ideal is, as we have said, a rich loam, but if the soil is strong and rests on clay, it is less expensive to reduce it to a suitable condition for vegetable growing than in the case of a very sandy soil. The first thing to do in making a vegetable garden is to trench the whole of the site 3 ft. deep if possible, turning the top soil 2 ft. deep, and breaking up the subsoil to a depth of 1 ft. Where, however, the subsoil comes to within 1 ft. of the surface, bastard trenching must be employed. This is a kind of false trenching, where the top soil is simply moved forward and not buried 2 ft. deep. Trenching is fully described in our article on *Soil Cultivation.* This work should be done whatever the nature of the soil may be, but if the soil is light, the manures used will be cow or pig dung, whereas if the soil is heavy, strawy stable manure will be far preferable. In digging the vegetable garden, care should be taken to mix the manure with all sections of the soil, except the 9 ins. immediately below the surface. The advice to manure the ground in the form of layers, that is to say, to put in a layer of manure at the bottom of each trench, is not a good plan, and frequently results in fanged roots.

The best time to manure the vegetable garden must now be considered. Where the ground is strong, manure should most certainly be applied in the autumn or early winter, the ground being left as rough as possible, and the digging completed as early after the end of October as can be managed. This will improve the tilth of the soil enormously, more than any gardener who has not seen it will believe. In the case, however, of sandy soil, manure applied so early will simply be washed through by the winter rains. In this case it would be advisable to give the ground a good dressing of chalk or chalk marl at the beginning of October, putting the material on in the form of rough lumps, and to delay manuring until mid-February or thereabouts, sowing almost immediately after manuring has been completed.

Artificial Manures.—Having now disposed of the question of animal manures, in connection with the soil, we must say a word or two on the question of artificials. Of course different artificials are needed for different crops; for instance, Peas need no Nitrates, Cabbages need no Phosphates, and so on. But, as a general rule, it is safe to say that heavy soils should be manured in the autumn or early winter, with such materials as Basic Slag, Cyanamide, Kainit, or Wood Ashes; and that light soils should be manured in the autumn with Bone Ash, Fish Meal, Flue Dust, or other similar semi-insoluble manures. Again clay soils should be manured in the spring and early summer with such fertilisers as

Sulphate of Ammonia, Sulphate of Lime, and so on, and light soils should be manured in the spring with such easily soluble manures as Salt, Nitrate of Soda, Potash manures, etc. Manures such as Guano, Dried Blood, Nitrate of Lime, and Nitrate of Ammonia, all of which are highly soluble in water, are useful for any kind of soil, but they should not be applied except during the growing season in the spring and summer. Dissolved Bones, Superphosphate, Sulphate of Ammonia, and other acid manures are useful for chalky soils containing excess of lime. These soils invariably produce scabs on potatoes. Old rich garden soils which have been manured for many years are often more or less sour, and for these soils, manures of an alkaline character such as Bone Ash, Calcium Cyanamide, or even Quicklime and Wood Ashes are more suitable than any others. Acid manures, such as Sulphate of Ammonia, Superphosphate of Lime, Dissolved Bones, and Dissolved Guano, should be avoided, with others of a similar character, as they will be useless for producing good crops on such soils.

General Management. — The special culture required by each vegetable is dealt with in the article on that vegetable published in the Dictionary, but a few general hints are appended :—

THIN SOWING.—This is most important if the crops in the vegetable garden are to be a success. Thick sowing is common, and produces more poor crops than anything else. In our articles the distances that should be left between the drills are usually indicated, and the advice there given should be strictly followed, as the writer on each vegetable is a practical gardener of many years' standing, who knows how much room crops require. Instead of sowing the whole packet, it would be much better to drop three or four seeds in along the drills at intervals of a few inches, as it stands to reason that the plants have a better chance then, than if they are crowded together with hundreds of seedlings in a few feet of drill.

THINNING OF CROPS.—If thin sowing is practised, very little thinning will be required, but where this is necessary it should be done early. The correct distances for thinning out are given under the vegetable concerned, and, needless to say, a day when the soil is wet should preferably be chosen for the work.

PLANTING OUT.—Crops of the Cabbage family need to be planted out, the most important points of this operation being to plant them extremely firmly in well-worked soil. It is a common fault to plant vegetables much too close together, to attempt, in fact, to grow three or four plants in the room sufficient for one. A practical man realises the folly of this method of procedure, and will keep to the planting distances which are named in the articles on each vegetable. Watering after planting is most important, it being inadvisable in the summer to trust the Clerk of the Weather to send rain the same night.

HOEING OF CROPS.—How many gardeners realise the enormous advantage resulting from the use of the hoe between food crops ? Certainly not 10 per cent. of them, or else we should not see weed-strewn vegetable gardens as we do. Certainly the hoe is one of the most valuable tools that the vegetable gardener can possess, and why he takes the trouble to purchase one and allows it to rust in his potting-shed, crying for use, is a question which we will not attempt to answer.

Hoeing stimulates the growth of the crops enormously. It also protects the under soil from undue evaporation, thus acting in a similar manner to a mulch, in addition to which it kills enormous quantities of weed seeds and of pests which may be lurking on the surface, such as cockchafer grubs. The present writer favours the regular use of the hoe at least once a week between all rows of standing vegetable crops, and he is of the opinion that were this done, many hundreds of tons of food we now waste would be available for the supply of the nation. Hoeing is also useful as a means of incorporating fertilisers with the land. For instance, Nitrate of Soda is sprinkled on the land amongst cabbage crops and hoed in.

MULCHING.—Mulching is of great importance in the case of Peas, Beans, and Cauliflowers. It is hardly applicable in the case of Cabbages and Potatoes, of which thousands of plants are grown yearly in the vegetable garden. Mulches, however, should be more used than they are, owing to the fact that they obviate the need of watering. A mulch, as explained elsewhere, consists of a light layer of material put on the surface of the soil, after it has been well watered, to conserve the moisture. The chief of the materials that are used for this purpose in the vegetable garden may be mentioned : Lawn Mowings in a fresh or rotten state, Cow Dung in a fresh or rotten state, and Spent Hops. Vegetable refuse in a rotten state is also used, as are leaves, but they are not so useful. The writer favours the application of mulches early in the season, before the soil has become really dry underneath, as this means that less watering will be needed before the mulching. The idea that mulches keep the roots of the plants too cold is a fallacy, provided that the mulches are not of inordinate thickness. Three inches is the most that should ever be put on at a time.

WATERING. — Watering in the vegetable garden is a vexed problem. Personally, the writer considers it is necessary only in special cases. If mulches are applied immediately after rain, very little watering will be required, but such crops as Celery, Peas, Runner Beans, and the like, which are exceptionally thirsty, will need watering in almost every season, however much rain there may be.

Again watering cannot be dispensed with altogether, since crops which are newly planted must have water to settle the soil about their roots, and to enable them to recover from the check to growth they have sustained. The general watering, however, of such crops as Beetroot, Cabbages, Kohl Rabi, Parsnips, Spinach Beet, Swedes, Turnips, and so on, is not to be recommended, and indeed is absolutely unnecessary if the soil has been properly worked at the start. Nor is mulching recommended for these crops. Surface crops, such as Lettuce and Spinach, cannot be grown without water, and if the season is dry they should have a thorough soaking every day, otherwise they will not be worth eating. The question of applying water is thoroughly dealt with in our article on *WATERING*.

WEEDING.—Of very great importance is the matter of weeding vegetables. We have already mentioned that the weeds should be got under early in the year by the frequent use of the hoe. This should be first plied between the rows, as soon as the seedlings can easily be seen, and in the case of potatoes as soon as the little shoots appear on the surface of the ground. However, it may be that the garden becomes weedy after the gardener returns from his ten days' holiday in July, and that is the most critical time of all. At once a start must be made to get up the weeds. Annual weeds can easily be pulled up by hand, but strong-rooting perennial weeds will have to be lifted with a little fork, otherwise much of their root system will remain in the ground and give further trouble. Perennial weeds should certainly be burnt. The others which are not in seed may be made into vegetable humus, as is explained in the article on *Vegetable Matter.* Every effort should be made, especially at the end of the season to prevent any weed from seeding, since this means much more trouble next season. The special weeds with which gardeners have to contend are dealt with in an article on *Weeds*, where a method of controlling them is also given.

Rotation.—This is of some importance to vegetable gardeners if good crops are to be obtained. It is dealt with in a special article on *Rotation of Crops and Double Cropping.*

Feeding.—This too is a matter of importance to the vegetable gardener. The usual liquid to apply is made up by putting a peck of fresh horse dung and a quarter of a peck of soot into a 40-gallon barrel of water, allowing it to stand about a week, then drawing off the liquid. Great care should be taken, however, that no crop receives the liquid too strong. It should be diluted until it is the colour of pale ale, or weak tea, and applied after watering in dry weather, or after there has been a shower. Various artificial fertilisers can be used, and where a crop requires a special fertiliser this is mentioned in the article on that crop. Care must be taken not to over-feed, or the results will be the opposite of those desired. It may be pointed out, that such crops as Onions and Leeks can stand a great deal more food than any other crops, and that it is hardly possible to over-feed them.

Pests and Diseases.—The vegetable gardener has to contend with a great many pests and a large number of diseases. We cannot even enumerate a list of these here, but must refer the reader to our articles on *Insect Pests, Slugs and Snails*, and *Garden Enemies*; and *Diseases of Plants* for diseases. Where a crop is infested with a number of diseases, as for instance is the potato, these form the subject of a special article; thus we have *Onion Diseases, Potato Diseases*, and so on. It should be urged upon every gardener that when a disease is noticed, however small or slight the attack may be, steps should immediately be taken to control or cure it, otherwise the disease may spread and ruin the whole of a promising batch of crops in the garden.

Varieties.—The number of varieties of each crop is almost legion, and it tends to increase year by year. Obviously, however, it will be a great mistake to attempt to include anything like a complete list of the varieties of each crop in this Dictionary, since many of them are the same variety under a different name. It is to be hoped that there will be a good deal of standardisation of names, as soon as attention can be turned by seed specialists to this, and that a standard list of vegetables will be issued at no very distant date. However, for our purpose we have included a list of the most desirable varieties, at the end of the article on each vegetable, and we append now a selection for light soils and heavy soils, which we hope will be useful to readers. It should be borne in mind that although when conditions are made favourable, each of the vegetables dealt with in these pages can be expected to give a profitable return for the labour expended, that not every variety of any particular vegetable is suitable for all soils. What gives good results when sown on a deep friable loam often proves a complete failure when cultivation is attempted on a poor sandy soil or a stony shallow one. In such cases experience alone is the safest guide. But the list below, although some may wonder at the inclusion of old-fashioned, well-tried varieties, consists in our opinion of the best sorts for heavy and light soils. In this selection the main consideration has been utility.

Selection for Light Soils.

Asparagus.—Connover's Colossal, Palmetto.

Beans (Broad).—Aquadulce, Enormous Hangdown, Giant Windsor, Harlington Green, Kinver Monarch, Knight's Tremendous.

Beans (Dwarf).—Canadian Wonder, Centenary (Golden), Dutch Brown, Earliest of All, Early Forcing, Everbearing, Golden Butter.

Beans (Runner).—Best of All, Exhibition, Prizewinner.

Beetroot.—Bell's (Non-Bleeding), Blood Red, Burpee's Black, Dobbie's Purple, Nutting's Dwarf, Volunteer.

Borecole (Kale).—Asparagus Kale, Dickson's Favourite, Dwarf Curled, Improved Hearting, Sutton's A1, Tall Curled.

Broccoli (Heading).—Adam's Early, Early Feltham, Eastertide, Edmonton, Last of All, Late Giant, Model, Self-Protecting, Snow's Winter White.

Broccoli (Sprouting).—Christmas or Extra Early, Green Sprouting, White Sprouting.

Brussels Sprouts.—Cambridge Champion, Dalkeith, Darlington Dwarf Gem, Exhibition, Matchless, Solidity.

Cabbage (August Sowing).—April, April Queen, Challenger, Defiance, Ellam's Early, Emperor, Flower of Spring, Harbinger.

Cabbage (Savoy).—Best of All, Early Tom Thumb, Green Curled, Latest of All, Perfection, Sugar Loaf.

Cabbage (Spring Sowing).—Early Rainbow, Early York, Express, Mein's No. 1, Nonpareil, Primo, Winningstadt.

Carrot.—Altrincham Selected, Early Gem, Early Nantes, Red Intermediate, St Valery, Scarlet Perfection, Summer Favourite.

Cauliflower.—Autumn Giant, Early Giant, Eclipse, Emperor, Magnum Bonum, Snowball, Standwell, Supreme.

Celery.—Aldenham Pink, Bibby's Defiance, Clayworth Prize, Standard Bearer, Superb Pink, White Gem.

Cucumber (Outdoor).—Japanese Climbing, Perfection, Pershore Long Ridge.

Endive.—Large Ruffec (new), Moss Curled, Paris White.

Kohl Rabi.—Early White, Sander's Small Top.

Leek.—Dobbie's Champion, Emperor, International Prize, Lyon, Prizetaker, Royal Favourite.

Lettuce (Cabbage).—All the Year Round, Favourite, Ideal, Lord Kitchener, Sutton's Magnet, Webb's Wonderful.

Lettuce (Cos).—Bath Cos, "Black Seeded," Crystal Cos, Exhibition, Hardy White, Jumbo, Kingsholm, Sugar Loaf.

Onion.—Ailsa Craig, Denver's Yellow, Excelsior, Exhibition, Improved Banbury, Magnum Bonum, Premier, Rousham Park Hero.

Parsnip.—Elcombe's Improved, John Bull, Lisbonnais, New Century.

Peas.—Autocrat, Capt. Cuttle, Carter's Michaelmas, Duke of Albany, Eureka, Glory of Devon, Ideal, John Howard, Laxtonian, Little Marvel, Perfection, Peter Pan, Rearguard, Rentpayer, Supreme, The Gladstone, The Lincoln, Thomas Laxton, Triumph, Walker's Perpetual.

Potatoes.—Arran Chief, Balmoral Castle, Dobbie's Favourite, Dobbie's Prolific, Drummond Castle, Golden Wonder, Guardian, Harbinger, King Edward VII, May Queen, Ninetyfold, Queen Mary, Ringleader, Snowdrop, The Chapman, Windsor Castle, Witch Hill Seedling.

Spinach.—New Zealand, Perpetual or Spinach Beet, Victoria.

Tomatoes (Open Air).—Cooper's First Crop, Evesham Wonder, Kondine Red, Market King, Recruit, Sunrise, Tuckswood Favourite.

Turnip.—All the Year Round, Early Marvel, Golden Ball, Green Top, Jersey Lily, Laing's Swede, Model, Snowball.

Vegetable Marrow.—Custard Marrow, Hibberd's Prolific, Muir's Hybrid, Pen-y-byd, Sutton's Perfection, The Sutton, White or Green "Bush" varieties.

SELECTION FOR HEAVY SOILS.

Asparagus. — Same as recommended for light soil.

Beans (Broad). — Bunyard's Exhibition, Eclipse, Exhibition Longpod, Green Giant, Johnson's Wonderful, Seville Giant Longpod.

Beans (Dwarf). — Canadian Wonder, Hundredfold, White Haricot (also others recommended for light soils).

Beans (Runner.).—In addition to those recommended for light soils, Champion, Emperor, Hackwood Park, White Giant.

Beetroot. — Acme, Cheltenham Green Top, Crimson Ball, Dobbie's Purple, Pine Apple, Pragnell's Exhibition.

Borecole.—Same as advised for light soil.

Broccoli.—Backhouse's Winter, Eastertide, Grange's Autumn White, Late Queen, Leamington, Ryder's June, Xmas Heading Purple.

Broccoli (Sprouting). — Same as advised for light soil.

Brussels Sprouts.—Those recommended for light soils are suitable.

Cabbage and Savoy Cabbage.—Same as advised for light soil.

Carrot.—Early Gem, Long Red Surrey, Model, Prizewinner, Sutton's Favourite, Webb's Defiance.

Cauliflower.—Same as advised for light soil.

Celery. — Same as advised for light soil.

Cucumber.—Japanese Climbing, King of Ridge, Stockwood Imp.

Endive.—Broad Leaf Batavian.

Kohl Rabi. — Early Purple, Early White, Sander's Small Top.

Leek.—Selections as for light soil.

Lettuce (Cabbage). — All the Year Round, Ideal, Lee's Immense, MacHattie's Giant, May King, Reliance, Wonderful.

Lettuce (Cos).—Balloon, Crystal Cos, Jumbo, Leviathan, Paris White, Perfect Gem, Vaux's Self-folding.

Onion.—All varieties mentioned under light soils are suitable.

Parsnip.—Elcombe's Improved, Hollow Crown, John Bull, Magnum Bonum, Tender and True, The Student.

Peas.—Autocrat, British Lion, Centenary, Duchess of Albany, Duke of York, Essex Star, Gradus, Hercules, King George, Late Queen, Peerless, Rearguard, Senator, Sharpe's Standard, Stourbridge Marrow, Telegraph, Telephone, The Daisy, The Daniel, The Gladstone, The Lincoln, The Pilot, Veitch's Perfection.

Potatoes. — Abundance, Arran Chief, Balmoral Castle, British Queen, Dobbie's Favourite, Epicure, Express, King Edward, Langworthy, The Admiral, The Crofter, The Factor, What's Wanted, White City.

Spinach.—Any variety offered in trade catalogues may be depended upon to give good results from heavy soils.

Tomatoes.—Same as for light soil.

Turnip.—Any variety offered in trade catalogues.

Vegetable Marrow.—Long Green, Long White, Moore's Cream. Also the White or Green "Bush" varieties.

F. R. C.

VEGETABLES: Harvesting and Storing.—The great general principle of harvesting and storing vegetables is "care." Care as to the crops being ready for lifting, care in lifting, care in preparation for and in actual storage, and care as regards persistent inspection after storage.

It will not be possible in the limited space at disposal to make full remarks on all the root-crops concerned, but we begin with a general discourse on

POTATOES.—By October the haulm of these will have died down somewhat, but if it has not, cut it down except in very late crops. Test the crops by digging up a plant, and if the tubers are plentiful and ripe, have them up. A good sign of ripeness is, that the skin on the tubers is set. But potatoes which are just right for eating must remain in the ground a few weeks longer if they are going to be stored. Still, do not err, as a writer has said, by leaving the tubers in the ground "to swell" long after the haulm has died down; lift them and get them stored.

Lift the tubers with a fork, "making it a point of honour not to spear a single one." For our own part we like to use a rather large fork for this work, and it is inserted well below the approximated range of the tubers. Then collect the tubers into baskets, making sure by successive forkings that none are left in the ground, and great care should be taken that no diseased or damaged specimens are included.

A very good way is to store the tubers in a "clamp." Scores of our readers will have watched a farmer building a clamp, but we briefly describe this as follows :—

Begin by putting a thick layer of straw on a piece of level ground. On this build up successive layers of tubers and straw in the form of a long, triangular ridge. Cover the whole with several inches of straw, and then bank up all over with soil, making very firm.

Some store in heaps covered and interspersed with sand. Again, others store their potatoes in heaps in dark sheds or in boxes, or in layers on the floor of such sheds, covering as a protection from frost by a mat or straw. Many other root-crops may be effectively stored in clamps, for instance, carrots, parsnips, and turnips.

Having said the above about Potatoes, we now proceed with a list of other root-crops in alphabetical order.

ARTICHOKES (*Jerusalem*).—The Jerusalem variety of these is, no doubt, by far the most grown, so we deal with it only. Cut down the plants any time between the end of October and November, and fork up the roots as required for use. Many, however, like to store their Jerusalem Artichokes. After sorting them carefully, bury the lot in a heap of yellow sand, ashes, or even earth. At all costs the light must be kept from these tubers, as if they are not kept in the dark they turn colour, and are not nearly so nice looking when served on the table. Besides this, frost should be kept out of the shed in which they are stored. If not buried, mould will set in and the tubers will be spoilt.

BEETROOT.—This requires extreme care in the lifting. Use a fork, and on no account damage the roots the slightest or they will bleed badly and become useless. Your care cannot be too great. The tops should be gently twisted off. Do not, however, touch the crown. Beetroot is certainly a difficult vegetable to deal with. If it can be eaten at once, so much the better ; if not, lift before frost, storing in sand in a cool shed, protecting from frost with straw.

CARROTS.—These must be lifted before frost with the fork carefully. and the roots should not be speared or broken. If there be any undesirably thin tap-root, however, cut this off and remove the "tops." Store in a moderately dry shed, protecting the heap from frost with mats or straw, removing these coverings in all cases as soon as the danger is past; or store in the clamp already described.

LEEKS.—These are hardy things, and after they have been somewhat earthed up may remain without protection all the winter, and be dug up as needed. Some put a thick layer of manure or straw around them to protect from frost, but we think this is quite unnecessary. Leeks may be stored in a shed under cover in sand, as also may *CELERY*, or they may be kept for a long time during the winter "laid in."

Onions.—These should be lifted on a sunny morning and left lying on the ground till the early afternoon, or, if the weather be good, for a few days. This is done when they are sufficiently ripe in September, the necks having been previously broken a month earlier if necessary. They are stored, when dry, by tying in bundles and suspending from pegs or pothooks in the garden storeroom. Keep them dry.

Parsnips.—Very little in the way of harvesting and storage is needed for this crop. In our opinion it is better left in the ground right through the winter, and forked up in the winter months when required for immediate use on the table. It is better after frost. If, however, it be desired to store it, get to work with the fork, but, above all, leave plenty of room, or the roots will be damaged. Trim off the tops and store in sand in a cool, darkened shed. *Salsafy* may also be treated in the ways advocated above.

Turnips.—These can be got in when large enough, and this is usually done in September or October. They are forked or pulled up, and the tops cut off, some little further consideration being given by the gardener than by the farmer to this operation. The tap-root, if of any size, is usually cut off, and the roots stored in a darkened shed under mats or in a clamp. The same applies to *Kohl Rabi*, if it be desired to store the roots of this, the tops being first cut off, and the best of them eaten after being boiled. *Swedes* may be conveniently stored in a corner of a cellar or outhouse under a mat or old carpet, extra covering being afforded in very cold weather.

E.

VEGETABLES: Pests and Diseases of.—The articles containing notes on these matters will be found referred to in *Vegetables: General Considerations.*

VEGETABLES: Saving Seed of.—See *Seed Saving.*

VEGETABLES: Transplanting.—See *Transplanting.*

VEGETABLES UNDER GLASS.

Not the least important function of the hothouse, the warm pit, the frame on a mild hotbed, and the cold frame, nowadays, is the raising of vegetables, and not only the raising of seedlings, but the bringing of them to maturity also under glass. Time was when the hothouse was chiefly used for cultivating fruits requiring furnace heat to bring them to perfection, or for the growing of ornamental subjects such as Begonias, Orchids, Palms, etc.—plants that our climate would not permit to realise their full beauty, or was not sufficiently warm even to allow them to grow at all in the open. Modern demand for increased vegetable food and early supplies has changed all this, and now the production of vegetables under glass is nearly as important as is their outdoor culture.

In dealing with this subject, such items as cucumbers, marrows, and tomatoes will be left out, forming as they do an important group which is dealt with under separate headings throughout the work. These items, however, comprise only a small minority of the many kinds of vegetables that can profitably be raised under glass.

Much of our early vegetable supply has hitherto been imported from countries with warmer climes than our own; but there is no reason why we should not depend almost exclusively upon our own efforts, and produce in this country practically all that is required for home consumption. Much could be done in both private and trade gardens in such a direction where there is glass, and the quality of home-grown early supplies should always be equal to, and in many cases superior to, the imported article.

The subject may be divided under three headings :—

(1) Raising vegetables under glass to maturity;

(2) Growing under glass and maturing in the open; and

(3) The raising of seedling vegetables for planting out.

No gardener should count himself really efficient until he can attain complete success in all three directions.

The Use of Boxes.—In connection with this method, whether the plants are to run their course wholly under glass, or are to reach their zenith in the open air, in all cases the box system is undoubtedly the best. It is one of the most useful ways of growing vegetables, the idea being the employment of deep boxes; and no matter how large or small the available glass space may be, it proves its utility. One of the most convenient sized boxes is one measuring 30 × 10 ins. and 9 ins. deep; the best thickness of wood for the purpose is 1 in. thick for bottom and ends and ½ in. thick for the sides. Any handy person can construct such a box, and when finished it should have the bottom perforated with holes of sufficient size to permit free drainage, namely, not less than ¾ in. in diameter. A strip of wood 1 in. square nailed along the top of each end affords means for lifting the boxes conveniently about. This type lasts a long time, and can be moved from place to place as space is available or required for other things.

For raising seedlings for planting out, boxes measuring 20 × 11 ins., with an inside depth of 3 ins., will be found of very suitable size. Another useful box is that obtainable from nearly all fishmongers, being the case in which dried fish is imported, and generally called a "kipper box."

1. RAISING VEGETABLES UNDER GLASS TO MATURITY.—Amongst the vegetables that can be grown to the stage when they are fit for table entirely under glass, are Asparagus, Broad Beans and Peas, Climbing Beans, Globe and Long Beet, Carrots, Cauliflowers, Lettuce and other salads, and Potatoes.

Asparagus.—This delicious vegetable is one of the most easily forced. It is best brought forward in portable frames on mild hotbeds of leaves. Strong roots should be employed for this purpose, care being exercised that these are placed in position and covered as soon as possible after lifting, because, if they once become severely dry, the results will be anything but satisfactory. If a certain number of roots, according to requirements, are placed in the frames at intervals of a fortnight or three weeks, a regular supply of succulent heads can be relied upon throughout the early spring months, till the time comes round for cutting in the open, after which the frame can be utilised for many other crops. See also article on *ASPARAGUS*.

Broad Beans and Peas.—For very early crops sow the seed of early and second early Peas and Broad Beans in the boxes containing a compost of 2 parts good fibrous loam, 1 part well-decayed leaf-mould, and 1 part finely sifted horse manure, the latter for preference being obtained from an old mushroom bed. The sowing should take place very early in January and the seeds be raised in a gentle heat. They should be grown as sturdily as possible, and supported with small sticks as required. Give air freely, and avoid strong heat at all times. See also articles on *BEANS* and *PEAS*.

French and Climbing Beans.—For earliest supplies these will require to be grown entirely under glass. The seed should be sown at intervals during the depth of winter in the boxes, and liberal treatment once the seedlings are through will give heavy crops. See also article on *BEANS*.

Beet, Carrots, and Turnips.—These may either be sown and matured in heated pits or portable frames on mild hotbeds. Care should be taken in preparing the compost that it contains no wireworm. Old potting soil, with some finely sifted leaf-mould, makes an admirable medium for these subjects. Exercise care in ventilating. Never allow the growth to become drawn, and strictly avoid overcrowding, especially with Beet and Turnips. Syringe twice daily with tepid water in fine weather. Sow at intervals from the beginning of January to the middle of March. See also articles on *BEETROOT*, *CARROT*, and *TURNIPS*.

Cauliflowers.—Those sown in the autumn (September), and which have been pricked off into cold frames, are ideal for the work, but the strongest plants only should be used. They should be lifted and planted in the boxes, three plants being allotted to each when the size above given is used. Grow them on in a temperature of 50–55° F., and they can be had early for cutting. If the room they occupy is wanted for other crops, they may be hardened off, placed in a warm sheltered spot out of doors, and their growth finished in the open. Where room permits, they could be completely grown in the bed of a house, in a good depth of rich soil. In all cases they require liberal feeding. Two very good varieties for this method are *Magnum Bonum* and *Early Forcing*. See also article on *CAULIFLOWER*.

Lettuce.— This can be raised and matured in frames, care being taken to avoid a strong heat. The compost should be similar to that recommended for Carrots, etc., and should be made very firm. Give air freely at all times. The quick maturing cabbage varieties are the best for this purpose. See also article on *LETTUCE*.

Potatoes.—Very early Potatoes can be obtained in the boxes, or in 12-inch pots, small tubs, etc. The receptacle requires to be three-quarters filled with a compost composed for the larger part of well-decayed leaf-mould, more being added from time to time, by way of "earthing up," as the growth permits. They require an intermediate temperature, and the seed tubers should be greened and sprouted beforehand. Heated pits and frames may also be employed for this crop, removing a fairly good depth of the old bed and replacing it with the before-mentioned compost. *Midlothian Early* and *May Queen* are two varieties that lend themselves admirably for this purpose. For general hints on Potato Cultivation, see article on *POTATO*.

2. GROWING UNDER GLASS AND MATURING IN THE OPEN.—There are a number of vegetables which can, with great advantage, be raised to a stage under glass between the seedling and the mature plant, being hardened off and put out of doors in the boxes recommended,

or, if raised in frames, have the lights thereof removed, and thus grown on to table condition in the open air. By these means early supplies, coming in between the very early productions grown and matured in heat, and the much later maincrops grown in the open, are obtained. Primary amongst these are Broad Beans, Cauliflowers, Celery, Parsley, Peas, and Radishes.

Broad Beans.—Grown in the same way as the Peas, these can be plunged in their boxes three parts deep (as hereafter recommended for Peas), the growth being supported by stout string run between strong stakes placed at intervals along the rows formed by the boxes.

Cauliflowers. — One method of growing under glass was dealt with in the previous class. Another way is to plant them in frames on a mild hotbed, at distances of 2 ft. between the rows and about 16 ins. from plant to plant, the space between the rows being utilised for growing early Radishes. As the latter finish, Celery can be put in in their stead, and when the Cauliflowers mature and are cut, more Celery can take their place.

Celery.—This has just been dealt with, and it only remains to add that blanching can be effected by means of brown paper tied round the plants. See also article on *Celery.*

Parsley.—This is in request in nearly every household throughout the winter, and little trouble will be experienced in supplying it if late sowings are lifted from the open and placed in cold frames during September and October. Soot should be supplied plentifully to this vegetable. See also separate article.

Peas.—These have already been mentioned as to raising them under glass. If their room is required, then they can be hardened off thoroughly in cold frames and put outside at the foot of a south wall or building. Later on the boxes can be plunged in the ground about three parts deep, in rows, selecting a sheltered sunny position for them. Give plentiful supplies of water and liquid manure, and place the sticks necessary to support the growth *outside* the boxes. Grown this way very heavy crops can be obtained. Three good varieties for thus growing are *Quite Content*, *Duke of Albany*, and *Little Marvel*.

Radishes.—It is hardly necessary to devote special frames for this crop, as these can generally be intersown successfully between the various other crops from time to time. See also article on *Radish*.

3. The Raising of Seedling Vegetables for Planting out.—There is no question but that it pays in all ways to raise many vegetable seeds under glass, and some of these, such as Celery, Celeriac, Leeks, Lettuce, and Onions, are best raised in boxes in heat in such a place as an Early Vinery or a Peach House.

Celeriac requires the same treatment as Celery below.

Celery.—This requires a fairly light sandy compost, and the seeds should not be sown before 10th February, or the seedlings allowed to become dry at the root, otherwise the result will probably be a premature running to seed.

Leeks should be raised in the same way as hereafter recommended for Onions.

Lettuce can be sown at intervals and raised in the same way as suggested for Celery.

Onions.—By raising Onions in this way, one is able to plant out in a stage sufficiently large to practically escape the ravages of the dreaded Onion Fly, the bulbs ripen earlier, are better for keeping, and can consequently be cleared sooner, thus freeing the ground for other crops. The seed should be sown thinly in a compost such as recommended for Peas, to which is added sufficient sand to keep it thoroughly open. The mixture should be fairly fine, say able to pass through a ¼-inch sieve.

When the seedlings are about 1½ ins. high prick them out into other boxes at about 3 ins. apart each way in slightly coarser compost, to which add a small quantity of bonemeal. In all stages keep close to the glass to afford plenty of air and light. About the third week in March start to harden off, and plant out about the middle of April. A temperature of about 55–60° F. is best for raising in, and the soil should be kept moist. See also article on *Onion*.

In all cases seedling vegetables raised in heat must be well hardened off before they are planted out. See article on *Hardening Off*.

Ed. B.

[For Seakale, etc., see our article on *Vegetables: Blanching and Forcing*.—Editor.]

VEGETABLES: Varieties of.—These are given at the end of each article on a vegetable. For selections for Light and Heavy Soils, however, see *Vegetables: General Considerations*.

VEGETABLES: Weights of Bushels of.—See *Weights and Measures*.

VEITCH'S SILVER FIR (*Abies Veitchii*).—See *Trees*.

VEITCH'S VIRGINIA CREEPER (*Vitis inconstans*).—See *Climbing and Trailing Plants*.

VENETIAN SUMACH (*Rhus Cotinus*). See *Shrubs*.

VENTILATING FERN HOUSES.—See *Ferns and Fern Gardening*.

VENTILATION.

This is of importance for two principal reasons, namely, for giving air to the plants,—for plants as a general rule need nearly as much fresh air as human beings,—and secondly, as a means of drying up surplus moisture, and so preventing that dreaded malady "damping off" from setting in.

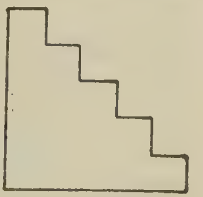
Ventilation is done in many very careless ways. For instance, one often sees the bottom ventilators open during the bitterest weeks of the year, and the cold air, also snow as well, blowing in.

As ventilation is of such great importance, greenhouse builders should contrive an arrangement by which the cold air can first be warmed on cold days by passing over or near the heating apparatus. Then the lower ventilators will not need to be open.

The top ventilators of greenhouses should be opened more often and more freely than they are. Much less damage will be done this way than by allowing bitter winds to blow right on to the plants through the bottom ventilators.

With span-roofed houses, so long as there are ventilators at both sides and both ends, air can be admitted on the opposite side from that on to which the wind is blowing. That is a small point not often thought of, but how important it is!

A word must be said about ventilating frames. This should be done on all fine days, for the more air the plants get, the hardier and stronger they will be. Ideal supports for the framelights can be made by cutting pieces of 2-inch thick wood into "steps," as is shown



Frame Ventilator.

in the illustration. When only a little air is needed, support the light on the lowest step; when more is wanted, rest it on other steps. Tilt the light so that the wind passes over it, and not under it, on bitter days. See also article on *Hardening Off*. E.

VENTILATION OF GRAPEHOUSES or VINERIES.—See *Vines*.

VENUS'S LOOKING-GLASS (*Specularia*. Nat. Ord. Campanulaceæ). — This plant, sometimes known as the Corn Violet, is one of a group of very charming, hardy, summer flowering annuals, named the Specularias, all of which are eminently suitable for the decoration of spaces in the rock garden. Autumn sowing where the plants are to flower suits them best, but whether sown in the spring or the autumn they should certainly be thinned out to about 6 ins. apart each way. The following are the best species :—

Specularia falcata. — A blue summer blooming annual, about 1 ft. high.

S. hybrida.—Pale blue or lilac, blooming from June onwards. About 6–12 ins. high.

S. pentagonia.—Deep blue, blooming from July onwards, and averaging 1 ft. high.

S. perfoliata. — A purple-blue species, flowering about midsummer, and growing about 1 ft. high.

S. Speculum (Syns. *S. arvensis, hirsuta, stricta,* and *vulgaris*).—This is the well-known Venus's Looking-Glass so often grown. It is almost needless to say that it bears white or purple flowers through the summer, and averages 12 ins. in height.

VENUS'S NAVELWORT. — A name applied to *Omphalodes linifolia*.

VERATRUM (False Hellebore. Nat. Ord. Liliaceæ).—This is a genus of poisonous plants all of which are hardy herbaceous perennials quite undesirable in gardens where children play among and pluck the flowers unchecked, but they are none the less beautiful. From the root of *V. album* the well-known nasal irritant *White Hellebore Powder* is obtained. This genus must not be confused with the true Hellebore described in our article on *Helleborus*.

Culture.—The cultural requirements of Veratrums are of the simplest, though they certainly appreciate a rich deeply worked soil, the richer the better; otherwise ordinary border culture which is often so haphazard will prove quite as successful in their case as with any other genus of plants. They may be easily propagated by seeds sown at the usual time, also by root division in the autumn or spring (but gloves should be worn for this operation). Planting may be successfully carried out from mid-March onwards.

What to Grow.—We recommend the following :—

V. album (White Hellebore).—This, as its name implies, bears white flowers. It blooms from July onwards, and averages 4–5 ft. in height.

V. lobelianum is a synonym of the above.

V. nigrum.—This bears very dark purple, and at times almost black flowers from June onwards, and grows 2–3 ft. in height.

V. viride.—This is popularly known as Indian Poke. It is the least desirable of all, bearing greenish flowers in July, and averaging 4 ft. in height.

VERBASCUM.—See *Mullein*, and under Mullein in *Medicinal Herbs*.

VERBENA (Nat. Ord. Verbenaceæ). Florists' section, greenhouse and half-hardy herbaceous plants, 1–2 ft. high, succeeding in light, rich, sandy loam, and propagated by seed or cuttings.

Culture.—Seed sown in early spring in the greenhouse will produce plants for summer flowering, either transplanted out of doors when safe against frost, or potted up for indoor decoration. Particular varieties or colours are perpetuated by cuttings from the young growths, and rooted in light, sandy soil.

USES.—Verbenas are more used for border work nowadays than grown under glass as florists' flowers as they used largely to be. Their brilliant colours and long season of bloom, which lasts throughout summer, make them valuable for both beds and herbaceous borders.

Varieties.—With the exception of the well-known variety, *Miss Willmott*, few named Verbenas are now sold. As, however, choice strains of seed are offered in separate colours, and these come practically true, this fact is hardly to be regretted.—J. L. G.

VERBENA: LEMON SCENTED.—See *ALOYSIA*.

VERBENA SPECIES.

Apart from the florists' section already described, there are a few useful species of Verbena which are quite hardy and well worth growing.

Biennial Border Species.—These require the usual treatment given to hardy biennials, being sown one year for blooming the next. We recommend the following:—

Verbena Aubletia (Syn. *V. Oblaetia*).—This is the well-known ROSE VERVAIN bearing purple flowers from July to August, and growing 9–18 ins. high.

Perennial Border Species.—These are useful hardy herbaceous perennials quite easily grown in light, rich soil, and useful also in the shrub border, or in marginal borders to the wild garden. The taller forms need to be efficiently staked, but otherwise the plants look after themselves. They may be propagated in the usual way by root division in March, which is the best planting period. We recommend the following:—

Verbena biserrata.—Syn. *V. polystachya*, which see.

V. caroliniensis.—Syn. *V. polystachya*, which see.

V. officinalis (COMMON VERVAIN).—This is probably the best known species. It bears purple flowers from June to August, and grows 1–2 ft. in height.

V. polystachya (Syns. *V. biserrata* and *V. caroliniensis*).—This is quite the best species of all with its brilliant red flowers from July to August, on plants 3–5 ft. in height.

VERDIGRIS.—See COPPER ACETATE in *COPPER AND CUPRUM COMPOUNDS*.

VERDIGRIS FUNGUS.—See HARMFUL FUNGI in *FUNGI: EDIBLE AND HARMFUL*.

VERNONIA (IRON WEED. Nat. Ord. Compositæ). — This is a pretty genus of plants which should be more grown, as up to the present time it has been much neglected.

Greenhouse Species. — Only one species responds to cool greenhouse treatment, namely, *Vernonia sericea* (Syn. *V. acutifolia*). This bears purplish flowers in December, and averages 5 ft. in height. A number of STOVE SPECIES are excluded in accordance with our note on *STOVE PLANTS*.

Perennial Border Species.—These are hardy herbaceous plants unsuitable for the front of borders as a rule since they grow somewhat tall. They may be used for the back rows, however, and are also useful for the sunnier front rows of the wild garden borders, where they form bold subjects. Ordinary light loam suits them admirably, and some will succeed well in town gardens. Propagation by seeds in the summer and root division in the usual manner in the autumn or spring is a simple matter, and successful results may confidently be anticipated by planting in March. We recommend the two following :—

Vernonia altissima (Syn. *V. angustifolia scaberrima*).—This bears purple flowers in October, and averages 10–11 ft. in height.

V. novaeboracensis (Syn. *V. praealta*).—This also bears purple flowers, but blooms in July and August. Its height averages 4–8 ft.

VERONICA (SPEEDWELL. Nat. Ord. Scrophulariaceæ).—About a hundred species of Veronica are grown at Kew, but obviously to describe anything like this number here would be quite beyond the scope of the present work. There are hardy annual, greenhouse perennial, shrubby, as well as hardy perennial or herbaceous border species and rock garden species to choose from, but with the two former we need not trouble here, although *Veronica glauca*, a blue annual, is useful as an edging plant. The best evergreen shrubby Veronicas are included in our list of shrubs (see *SHRUBS*), so these also are not described or included in the present article. Any ordinary garden soil (provided it is moderately gritty) seems to suit the plants, which are mostly very easy to grow. They are best propagated by division of the roots in the spring, which is also the best time to plant, though in warm districts November planting gives satisfactory results.

Perennial Border Species.—We describe a few of the best below, and may point out that most of the rock garden species are suitable also for the perennial border if used as edgings :—

Veronica Allionii.—This blue sort flowers in May, and attains a height of 6 ins.

V. alpina.—This is a blue sort suitable for edging purposes and flowering in May. Its height is 4 ins.

V. austriaca (Syn. *V. multifida*).—This is a useful blue July flowering species growing about 12 ins. high.

V. azurea.—This attractive blue sort flowers in May, and grows about 1 yd. high.

V. caucasica.—A very useful sort bearing light red flowers from June onwards. Its height is about 12 ins.

V. Chamaedrys (GERMANDER SPEEDWELL).—This sort bears bright blue flowers for a lengthy period in the summer. It grows about 6 ins. high.

V. gentianoides.—This bears pretty violet blooms from June onwards, and grows about 2 ft. high.

V. hybrida.—There are two varieties of this, namely, *newryensis* and *tobascorrensis*. Both bear blue flowers and bloom from June onwards, averaging about 12 ins. high.

V. incisa.—This bears blue blooms from July onwards, and averages 2 ft. high.

V. longifolia.—This bears its attractive blue flowers from June to August, and averages 3 ft. in height. The variety *subsessilis* is now recognised as a distinct species, and is thus described separately.

V. montana.—This attractive blue sort flowers in July, and grows about 6 ins. high.

V. multifida.—Syn. *V. austriaca*, which see.

V. officinalis (FLUELLEN, etc.).—This, used for medicinal purposes, is not largely grown. It is a blue

June flowered plant averaging about 4 ins. in height.

V. paniculata.—Syn. *V. spuria,* which see.

V. pectinata.—This is quite a useful sort. It bears blue flowers from May onwards, and averages about 12 ins. in height.

V. prostrata.—This indispensable sort is now named *V. Teucrium dubia,* and is described under the rock garden species further on.

V. repens.—This is a useful white-flowered sort blooming in August and September. It height is about 3 ins.

V. rupestris.—This is a synonym of *V. prostrata* and *V. Teucrium dubia.* It is described under the latter name in the rock garden species below.

V. spicata.—This, described under rock garden species, is exceptionally useful as well for the front of perennial borders.

V. spuria (Syn. *V. paniculata*).—This useful blue sort blooms in June, and averages 18 ins. in height.

V. subsessilis (Syn. *V. longifolia subsessilis*). — This undoubtedly popular blue-flowered sort blooms from July through August and sometimes into September. Its height is 2–3 ft.

V. Teucrium dubia (Syns. *V. prostrata* and *V. rupestris*).—This sort, indispensable for edging, is described under the rock garden species below.

Rock Garden Species. — Many species of Veronica are most suitable for the rock garden on account of their dwarf compact habit. Six of the best are described below, which will thrive in any open position in sandy well-drained soil, and are propagated by division of the roots in autumn or spring.

Veronica canescens.—This is a creeping plant forming close carpet-like mats. Leaves minute hoary. Flowers pale lilac. Site, half-shade. Soil gritty, moist loam. Flowering Period, June to August. Height, 1 in.

V. filifolia.—This forms tufts of short stems clothed with finely divided leaves. Flowers light blue. Site sunny. Soil light loam. Flowering Period, May to July. Height, 9 ins.

V. incana.—This dwarf species has silvery-white foliage. Flowers deep blue in spikes. Site sunny. Soil gritty loam. Flowering Period, June to August. Height, 9 ins.

V. saxatilis (ROCK SPEEDWELL).—This forms mats of slender woody stems, with evergreen foliage. Flowers rich blue, with crimson eye. Site sunny. Soil gritty. Flowering Period, June to September. Height, 3 ins.

V. spicata.—This is a most useful dwarf evergreen species splendid alike in the herbaceous border and rock garden. Flowers clear blue in dense spikes. Site sunny. Soil gritty loam. Flowering Period, July to September. Height, 9 ins.

V. spicata alba bears white flowers, while the variety *rosea* has pretty rose-pink flowers.

V. Teucrium dubia (Syns. *V. prostrata* and *V. rupestris*).—This is a low-growing evergreen plant. Flowers blue in long spikes. Site sunny. Soil sandy loam. Flowering Period, June to September. Height, 3 ins.

VERONICA MILDEW.—See *DISEASES OF ROCK PLANTS.*

VERVAIN.—A popular name for *VERBENA,* which see.

VERVAIN MALLOW (*Malva Alcea*).—See *MALVA.*

VERVAIN SAGE (*Salvia Verbenaca*). See *SALVIA.*

VESPA.—See under WASPS in *INSECT PESTS.*

VESPIDÆ.—See WASPS in *INSECT PESTS.*

VETCH.—See *Vicia.*

VIBURNUM.—For the best species see *Shrubs.*

VICIA (VETCH and TARE. Nat. Ord. Leguminosæ).—This is a large genus of hardy plants of no great value to gardeners, though some such as *V. Faba,* the BROAD BEAN, are grown as vegetables (see article on *Beans*), while others are grown as green manuring crops. The most important species after the Broad Bean are *V. bithynica,* the PURPLE VETCH; *V. Cracca,* the TUFTED VETCH; *V. Faba equina,* the HORSE BEAN; *V. hirsuta,* the COMMON TARE; *V. lathyroides,* the STRANGLE TARE; *V. Orobus,* the BITTER VETCH; *V. sativa,* the COMMON VETCH; *V. sepium,* the BUSH VETCH; and *V. sylvatica,* the WOOD VETCH. Some of these may be grown in the wild garden, but if space is precious they may be dispensed with.

VILLA GARDENING.

If the Englishman's house is his castle, his villa garden may be said to be his park, home grounds, and garden combined. True, most of our large towns now boast one or more public parks, where citizens may expand their lungs and rest their eyes on Nature's greenery; but the ordinary man, when laying out his villa garden, still cherishes a patch of green by way of a lawn, even if it be no bigger than his front-room carpet. There is much to be said for this grass plot, for where there is a family of young children it serves as a playground in the summer and a place where meals may be eaten out of doors—a virtuous practice which should certainly be encouraged.

Speaking in general terms, the usual villa garden in an average city suburb is in two parts: a small, square, front garden of varying size, and a narrow strip at the back, in length from 30 to 200 ft., or even more. Dealing first with the front garden, if this is an ample square of, say, 20–30 ft., there will be all sorts of possibilities for a successful planting of shrubs and flowering trees. Care must be taken to avoid anything which will grow big and block a full volume of light into the house. I have in mind, as I write, a residential road in a modern suburb in North London, where all the front gardens are protected from the public footway by a low wall, surmounted by a privet hedge. This hedge is supported or guarded at each end by a pollarded lime tree of considerable size. The general impression is that of a row of giant policemen on duty awaiting a royal procession to pass along. It is formal gardening carried to the extreme of ugliness. If trees are desired to add beauty to the road, choose one of the flowering varieties such as the Almond, Double Peach, the copper-leaved *Prunus Pissardi,* the Rowan (glorious in the autumn), or a graceful Silver Birch. Laburnums and Thorns are beautiful when in flower, but not attractive after.

As regards the border hedge, if such is desired to shield the garden from the road, there are distinct advantages in the golden privet and golden yew. Both can be trimmed, and they brighten up the landscape in winter. Variegated holly is also useful. By the sea the golden Euonymus does very well for the same purpose. In the Garden City, Letchworth, dividing hedges are often found of Dorothy Perkins roses, pretty whilst in flower, but at all times unruly subjects. Among other shrubs which do well in the ordinary front garden, the following may be mentioned: Aucuba, Berberis, Choisya, Cistus, Cotoneaster, Daphne, Garrya, Juniper, Ribes, *Veronica Traversii,* and Viburnum. Care should be taken to avoid crowding; also subjects which may tear a hole in your visitor's new summer frock when she makes a call upon you, should not be planted.

The front of the house will usually lend itself to some adornment either by the judicious use of climbing roses such as *Gloire de Dijon* or *William Allen Richardson*, or by such useful climbing shrubs as Forsythia and *Pyrus japonica* (early flowering), *Clematis montana* (May flowering), Pyracantha (crimson autumn berries), Yellow Jasmine (winter flowering). There are many others equally suitable.

The rest of the front garden may be devoted to a border by the house for early bulbs and wallflowers, with a late planting of annuals, or, if something more formal is desired, bright geraniums or begonias.

Turning now to the strip of garden at the back of the house, our thoughts naturally go in the first instance to food production. Before the War I would have hesitated to advise the introduction of any food crops other than such subjects as peas, tomatoes, scarlet runners, and marrows in any but the larger villa gardens. Even now, though so great an interest is taken in vegetable growing by nearly everyone, I will not recommend the planting of cabbages in the villa garden unless you are an entomologist, with a hobby for rearing white butterflies, ichneumon flies, and cabbage moths.

In arranging the position of the vegetables in the villa garden, if possible keep them well away from the house. They will then be much cleaner and healthier, and you will avoid large expanses of brown earth right underneath your windows. On the other hand, the patch of lawn—if you can afford it—may be as near the house as possible, so long as it gets plenty of sun; otherwise it will suffer from moss, and wear damp and sodden.

Planning a Villa Garden.—In planning out my own garden, a narrow plot measuring 24 ft. wide by about 120 ft. long, I aimed first of all at veiling the ugly timber of the boundary fences with greenery, and, secondly, to give the impression of greater size to the garden, by curving paths, the right placing of rose arches and rose screens, the allocation of a section for a miniature rock garden, and another for a perennial border. The fences have been veiled with currant and gooseberry trees, with here and there a Pyrus, Forsythia, Ceanothus, and Jasmine, to give colour in their flowering periods. On the north fence, facing south, a rose screen of *Dorothy Perkins*, *Crimson Rambler*, *Tea Rambler*, and *William Allen Richardson* shields the lawn from observation from the next garden. This gives a little more privacy than would otherwise be the case. An escarpment of rockwork, with shrubs and alpines, catches the eye from the dining-room window, and at the far end of the garden a rather larger piece is devoted to more rock plants and ferns. The perennial border leads from the lawn to the bottom of the garden, with a mixed bed of roses, pinks, etc., on the left hand side of the path. The principal rose arch, a double structure with *Hiawatha*, *Crimson Rambler*, *Gloire de Dijon*, and *Gruss an Teplitz* meeting in gay company overhead, divides the lawn section from the other part of the garden. In this small domain I find it possible to grow over two hundred varieties and species of flowering plants. That there is crowding at times, I do not deny, especially among the rock plants, but the number and variety add to the joys of the garden, for there is always the expectation of discovering some new favourite in flower. In a small garden, if the aim is variety, the strong-growing plants must be excluded or vigorously cut back. In the herbaceous border, for instance, Paeonies and Oriental Poppies, the larger Delphiniums, Sunflowers, and Michaelmas Daisies should be avoided. It pays better to devote the space to Delphiniums, such as *Belladonna,* to long-spurred Aquilegias, Pyrethrums, Lilies, the less common Irises and bulbs, Lupines, Canterbury Bells, Œnotheras, Salvias, especially *S. patens,* Doronicums, Phloxes, the fairy-flowered Michaelmas Daisies, Heleniums, Anchusas, etc. Antirrhinums and Pentstemons will work into gaps left by the spring bulbs for the summer months. If you can spare a small bed for Crown Imperials and Tritomas, you will be rewarded with a most interesting lily subject in the spring and a grand bit of colour in the autumn. The perennial border may be backed by pillar roses or a rose trained along a chain. *American Pillar* is a good subject for the latter purpose.

For a sunny border there is nothing more delightful than grey-foliaged plants with blue or mauve flowers, sweetly scented, of course. We find Thyme, Rosemary, Lavender, Catmint, Cotton Lavender, and *Salvia patens,* with Ceanothus on the fence, ideal subjects for such a position.

If there be room for fruit trees, a Victoria and Golden Drop Plum, a Cherry, a Siberian Crab as standards, and apples or plums as espaliers or cordons, will all alike add beauty and fruitfulness to the garden.

The Villa Rock Garden.—A word, in conclusion, about the rock garden. If the garden has a sunny aspect, speculate in sun-loving rock plants, and give them plenty of room, especially in the matter of root run. A few include Saxifrages (encrusted varieties), Sedums, Sempervivums, Campanulas, Gentians, Lithospermums, Arenarias, Aubrietias, and Rock Roses. Thus it will be seen that there is a wide selection of sun-loving plants to choose from.

For a shady garden it is better to rely upon Anemones, Primulas, heaths, Violas, mossy and fleshy-leaved Saxifrages, Ramondias, and the rarer species of ferns. After some experience, I have come to the conclusion that it is not worth while devoting time and money to the high alpines in a villa garden. Even in the moraine, they only live for a summer or two, and then often in a semi-consumptive state that worries you every time you look at them. Among the rock plants of greatest value for the villa garden I would name Anemones, Campanulas, Primulas—an extraordinarily interesting family—and Saxifrages. There are enough good things in these four families to give interest all the year through.

S. G.

[Our contributor, who has had a long experience as a villa gardener, ably shows in this article the immense possibilities there are even when the area is excessively small. Those who think their small villa gardens are no use for producing food, fruit, or flowers, should take courage, and try some of the above. See also our article on *TOWN AND CITY GARDENING.*—EDITOR.]

VILLARSIA.—Now included in the genus *LIMNANTHEMUM.*

VINCA. — See *PERIWINKLE* and *SHRUBS.*

VINE.—See Vitis in *CLIMBING AND TRAILING PLANTS*, and see also *VINES.*

VINE BORDER.—See under MAKING THE BORDER in *VINES.*

VINE BORDER CLEMATIS (*Clematis Vutucella*). — See *CLIMBING AND TRAILING PLANTS.*

VINE-LEAVED ABUTILON (*Abutilon vitifolium*).—See *CLIMBING AND TRAILING PLANTS.*

VINE MAPLE (*Acer circinatum*).—See *TREES.*

VINE MILDEW.—See *DISEASES OF PLANTS.*

VINE WEEVIL.—See under OTIORHYNCHUS WEEVILS in *INSECT PESTS.*

VINES (*Vitis vinifera.* Nat. Ord. Ampelidaceæ).—Vines are a very graceful and accommodating fruit, and will grow in almost any kind of soil or structure, where light and air can be given them. Span-roofed, three-quarter-span, and lean-to houses are the general style of structure found most suitable. The width of the house should not be less than 15 ft.; ventilation, heating, and other details may safely be left to the builders. Wires should be 10–12 ins. apart and not less than 20 ins. from the glass; by this means the vine leaves are less apt to get scorched or chilled. Let us suppose the house to be constructed on the above lines in a nice light, open position, away from the shade of large trees, sufficiently high to admit of natural or easy drainage. (Low situations with wet, cold subsoils, we may remark, should be avoided, or precautions taken to raise the borders above the ground line. A well-drained border is much drier and warmer than one too low or water-logged.) Then the depth of the border is our next consideration. This may vary from 2 ft. to 2 ft. 6 ins.; there should not be less than 12 ins. of good drainage. It is, therefore, necessary that a depth of 3 ft. 6 ins. to 4 ft. below the front sill be left to admit of a layer of concrete,—the concrete is not always necessary,—with broken bricks and lime rubble on top for the soil to rest upon.

Making the Border.—Success or failure often depends upon the way the border is made and drained; the concrete, if necessary, should have a gentle slope outwards towards the drains which carry the water away. Rough, broken brickbats should be placed over the concrete, and no pains should be spared in carefully levelling the top layers with fine rubble, otherwise in course of time the soil will work into the drainage and the roots will follow, with the inevitable result of shanking and other evils. Although the vine is found flourishing in nearly every kind of soil, and new turf cannot always be obtained near large towns, still fresh virgin loam is almost a necessity to ensure a lasting success. This may be obtained from roadsides or a stiff pasture, and corrected with other materials, according to its texture. A good compost consists of two-thirds good, fresh, fibrous loam; the remaining third should consist of lime rubble, charcoal, and burnt earth, with 10–12 per cent. of half-inch bones and bonemeal, to ensure a vigorous, short-jointed growth. No animal manure should be used, but a little soot is good if wireworms are present in the turf. Chop up the soil roughly, mix well, throw the compost into a heap, and keep under cover until required. Not more than 3–3½ ft. of the border should be made the first season; place a layer of turf, or even two, grass-side downwards, to the required width, using a similar turf to build up the retaining wall, filling in the prepared compost, which can hardly be made too firm. The making up of small borders is now generally done inside, as by adding to the borders every alternate year the vines can be kept in vigorous health for many years. Few good gardeners now make outside borders, but rely on the inside border only. The general practice years ago was to plant in spring ripened canes of the previous year's growth, and where this system is still adopted, shake away the loose soil from the ball, disentangle the roots, spread them out carefully, and plant in March. The planting of young growing vines from April to July, struck from eyes the same spring, is by far the better method, only in this case the ball must not be broken at all. Plant firmly, using fresh, warm soil, water with lukewarm water, shade slightly, and keep the vinery rather close for a few days until fresh growth has commenced. Vines on the single-rod system should be planted 3½–4 ft. apart, and those planted on the two-rod system in proportion. As soon as the former have made growth half an inch long, remove the growth by degrees down to the front sash, leaving one on each side with a leader; pinch the side-shoots once when they are 2 ft. long, and the leader, when it has made about 5 ft. of growth. Spring struck vines will cover the whole roof the same year. Encourage all lateral growth with plenty of good leaves, and so ensure plenty of good roots to build up next year's canes. The temperature for well-ripened vines of the previous year's growth should range about 50–53° F. by night, with 10° to 15° higher by day. The house must be kept moist by sprinkling the paths, etc., with water two or three times daily. Gradually increase the temperature to 60° F. by night as the vines increase in growth. Give top ventilation only as soon as a rising thermometer reaches 70° F., increasing as the temperature rises. Damp the houses, and close early in the afternoon, to dispense with artificial heat as much as possible. Caution is necessary never to damp the house when the temperature is low, as a low, damp temperature produces mildew. Spring struck vines require a close, moist atmosphere, with a night temperature of about 65–70° F., with 10° to 15° higher by day. As the season advances, front ventilators must be opened, and the amount of air increased as the wood begins to ripen, until both wood and roots are thoroughly matured, which will be about the end of September. Taking the young, growing vines first, these should be cut down to the ground, leaving about two buds; by this means a stronger growth will be secured, which must be carefully staked, tied, and guarded against injury until established.

Second Year's Treatment.—Prune the young vines early in January, leaving the leader about 3 ft. long, cutting the side-shoots close to the main rod, leaving two leaders on the two-rod system. Wash the house thoroughly, also the vine, with a strong insecticide, taking care never to damage the buds, and scrub the walls with hot lime-wash. Examine the border, and if many new roots have extended freely outside the border, remove about 3–4 ins. off the retaining wall with a sharp edging iron, adding about 18 ins. of new border as before. By thus cutting back the roots, numerous fibrous roots will result, which is a most important item. A little bonemeal or vine manure may be used with the surface dressing, but when the borders are made in a proper manner, stimulants must be used with caution, as much harm is often done in the early stages by the too liberal use of artificial manures. Close the house at the beginning of March, always avoiding high temperatures—50° by night, with the usual rise during the day, is quite high enough. Increase the temperatures as the season advances, and supply moisture as previously recommended. The vines may be lightly syringed once or twice a day until the buds burst; the syringe should then not again be used on the vines except in cases of emergency. There is very little danger of the leading shoot running away from the others. When time is given the vines break in a natural manner, without having recourse to a high temperature. Disbudding of young vines is most important; the spurs should not be less than 18 ins. apart on either side, and all except the two strongest should be rubbed off when about ½ in. long, selecting the best placed afterwards. Pinch the leading shoot after it has made about 5 ft. of growth, afterwards allowing the leader to extend its full length, pinching all tendrils as they appear. If the vines have made good progress, a bunch or possibly two may be left on each vine; in this case the side-shoots should be pinched two leaves beyond the bunch. Sub-laterals will start, which should in turn be pinched back to one leaf. Muscats are all the better by being allowed a little more freedom of growth. Do not be in a hurry to tie down the shoots; time and patience is required, since strong young shoots are easily broken. Thin them down by degrees, and, later on, they may be tied into any position without injury.

Pot Vines.—These are the best for very early forcing; by their use permanent vines may be allowed a longer season of rest. Space will not allow us to go into details of their culture; sufficient to say, good loam, rich top-dressings, with liberal supplies of manure and plenty of water, are necessary to bring them to maturity. A slight bottom heat in the early stages is an advantage, but not a necessity. A well-grown vine in a 12-inch pot will mature six or eight bunches of grapes; the right temperatures should not exceed those recommended for permanent vines. Black Hamburgh, Foster's Seedling, Madresfield Court, and Buckland Sweetwater are the best varieties for this purpose, and six months should be allowed from starting to ripening of the fruit.

Permanent Vines.—These should be started in time to have the fruit ripe by the end of September. It is impossible to go into every detail of their cultivation, as no hard and fast rule can be laid down to suit every case; but constant and careful daily supervision is necessary with the house and vines. Thoroughly cleanse before starting after being pruned. Prune the vines to two buds, leaving the leader about 2 ft. long each season, until it reaches the top of the house. After the shoots have made about ½ in. of growth, disbud the vines carefully, always selecting the best placed shoot, which generally shows the best bunch. Stop the shoots one or two leaves beyond the bunch, and tie down the shoots gradually. Stop sub-laterals as they appear at the first leaf. Gradually raise the temperature after the bunches are visible up to 65° F., for free-setting varieties. Muscats require a slightly higher temperature when in flower. It has, however, been proved that all grapes will set and mature their fruit in a much lower temperature than has generally been considered necessary. We have always been great believers in time and low temperature in the growing of all kinds of indoor fruits, especially in the early stages, as one of the best preventions against red spider, mildew, and other evils. Supply moisture by damping all available spaces to keep the vines healthy according to the outside atmosphere. Reduce the moisture considerably during the time the vines are in flower, and go over the bunches of Muscats and other shy-setting varieties in the middle of the day, with foreign pollen on the brush taken from Hamburgh or other free-setting varieties, tapping the rods of all varieties.

Thinning.—This requires experience and knowledge of the different varieties. You can only thin and regulate the berries in the first place, however; nearly all inside berries should be moved, those left will then place themselves in position as they swell. First remove all surplus bunches, leaving twelve or fourteen of the best, reducing them again at the second thinning. If large exhibition bunches are needed, a healthy rod will carry ten to fourteen bunches. The second thinning, which should be done a week later, is more important, as the size and shape of the bunch has to be considered. Remove all small and weak-necked berries, and tie up the shoulders according to the size of the bunch and variety. Large bunches need to be looked over even a third time.

Ventilation.—This, with watering, may be considered the most important operation connected with growing grapes. It is not only to regulate the temperatures, but to admit fresh air, which helps to keep the foliage clean and healthy. We prefer to close early, with a gradually increasing warmth in the pipes, keeping one eye on the weather, and the other on the boiler. With few exceptions in very cold weather a little night air should always be given, and especially is this necessary during the stoning period of Lady Downes' and Muscats, to prevent scalding, which is caused by imperfect ventilation or too high and moist temperature. Increase the ventilation early in the morning before the temperature rises too high. Reduce the temperature slightly, with a freer circulation of air night and day, while the grapes are colouring, and always keep a gentle warmth in the pipes for the above two varieties.

Watering.—Only from experience can it be realised the quantity of water well-drained borders require, and more young vines are injured from this neglect than from any other cause. A border tester should be used for inside borders; the old plan of withholding water just before the grapes are ripe is wrong. Heavily cropped vines where the finish is doubtful, should be given a good watering, if necessary using a quick stimulant. This, with careful ventilation day and night, and a gentle warmth in the pipes, will generally turn the scales in your favour.

Varieties :—*Black Hamburgh.*—The best early Grape of easy cultivation, medium bunches, covered with fine bloom, suitable for cold houses.

Foster's Seedling.—An early white sweetwater Grape of easy cultivation, an excellent companion to *Black Hamburgh* for early forcing.

Gros Colman.—A very large black Grape of second-rate flavour, handsome, and of good keeping qualities.

Lady Downes' Seedling.—An excellent late-keeping Grape of fine quality, that will keep in bottles in good condition till June.

Madresfield Court.—A fine purplish black Grape of strong Muscat flavour, handsome and excellent.

Muscat of Alexandria.—Bunches large, golden-yellow when well ripened, excellent in every way.

There are many other varieties of Grapes worthy of cultivation in large establishments. Some of these are—

BLACK :—Alnwick Seedling, Appley Towers, Black Alicante, Gros Guillaume, Gros Maroc, Muscat Hamburgh.

WHITE :—Buckland Sweetwater, Canon Hall Muscat, Chasselas Napoleon, Duke of Buccleuch, Mrs. Pearson, and White Frontignan.

F. J.

VINES : TOP-DRESSING FOR.—See *TOP-DRESSING.*

VIOLA (Nat. Ord. Violaceæ).

The modern Viola is sometimes termed the Tufted Pansy. It is one of the very best bedding and border plants in cultivation, and the finer large-flowered varieties are largely grown by amateurs as "Show" flowers. It differs from the Pansy proper in being more of a perennial in its character, in addition to which it produces a wider range of clear, clean, self-coloured flowers. This perennial character is derived from the parentage on one side. The early raisers who worked on it fifty to sixty years ago used *Viola lutea* and *Viola cornuta* as the female parent and crossed with pollen of the bedding pansies of the day. Both James Grieve and Dr. Stuart put on record these early parentages. The large-flowered pansy is derived chiefly, if not exclusively, from *Viola tricolor*, an annual species.

Culture.—Violas grow well in any good garden soil, but amply repay a little special attention. Having grown them for over thirty years, the writer's advice is to prepare the beds thoroughly in the autumn and plant early in March. In some districts where the soil is free and well-drained autumn planting can be carried out with success, especially with the hardier bedding varieties. In a very free or sandy soil, such as exists in the Royal Horticultural Society's gardens in Surrey, beds for Violas want special preparation to get first-class results. Some 4 ins. of the top soil should be temporarily removed from the beds, and a layer 2–3 ins. thick of old cow dung spread on the surface and forked in, after which the temporarily removed soil may be replaced. The roots soon go down and get hold of the manure, after which they grow amazingly. So much for a very free soil. On a medium or heavy soil the manure need only be thoroughly dug into the top spit. The plants should be set out in lines 12 ins. apart, allowing 8 ins. between the plants.

Propagation.—Violas are the easiest things to propagate. A cold frame is best, but a shaded border does all right for the bedding varieties. In August or September young growths should be pulled out of the centres of the old plants,—if a little piece of root is attached so much the better; if not, cut the growth cleanly across below the lowest joint. Dibble in sandy soil a few inches apart, and make very firm, sprinkling with water immediately, and later as required. In about three weeks they will have rooted. If in a frame with a sash over them, shade the glass with a little whitewash inside, and leave a little air on continuously.

Seed is easily saved from the best flowers if desired, or it can be purchased from any good seedsman. Sow in February in frame or cool greenhouse for late summer flowering. Sow in May or June for spring and early summer blooms. It is best to sow in a box of fine soil and cover the box with a sheet of glass till germination takes place. When the young plants have got three or four good leaves, transplant into larger boxes or a cold frame or even out of doors. If carefully looked after with water, and a little shade if necessary, they will grow rapidly. Transplant with all soil possible adhering to their roots when nice little bushes, and great will be the interest when they come into flower. If the flowering period is to extend, as is quite possible, from April to November, the dead flower heads must be regularly clipped off.

Varieties.—At first Violas were rayed or marked with lines on the lower and side petals, but now the pure self-coloured varieties are preferred, and the following lists embrace many of the choicest:—

FOR BEDDING: — *Crimson.*—Crimson Bedder.
Crimson Purple.—Councillor Waters.
Indigo Blue.—Archibald Grant, W. H. Woodgate (light blue).
Mauve. — Dunbryan (white centre), Fred Williams (dark), Maggie Mott (soft), Mauve Radiance (radiant colour).
Purple.—Jubilee (dark).
Rose.—William Niel (pale).
White.—Purity, White Swan.
White and Purple.—Mrs Chichester.
Yellow.—Grievii (pale), Kingcup (rayless).
FOR EXHIBITION: — *Cream.* — Jessie Harrison (tinted lilac), Mary Burnie (edged heliotrope), Willie Farmer (edged blue).
Purple.—Coronation (lighter edging).
Rose. — Moseley Wonder (marbled white), Mrs Robertson (large pink).
White.—Agnes Kay (edged heliotrope), Mrs C. Milligan, Mrs Quinton McFadyen (French white with heliotrope), Mrs W. R. Milligan.
Yellow.—Baron Newlands (edged heliotrope), Lord Kitchener (self), Moseley Perfection (deep).

The following twelve varieties of Exhibition Violas were oftenest shown in the winning stands at the National Pansy and Viola Show at Birmingham in 1918: David L. George, Kathleen Coates, Moseley Perfection, Moseley Wonder, Mrs J. Fisher, Mrs J. Smith, Mrs J. Terris, Mrs Mason, Mrs W. Barr, Mrs W. R. Milligan, Oxhill Purple, Sir Edward Grey.

Violettas.—This is a charming race of miniature flowered varieties, mostly very sweetly scented. The first of the race was "Violetta" (white with yellow centre), raised by the late Dr Stuart of Chirnside, Berwickshire, in 1887. Many new colours have been added to the section since.—W. C.

See also under VIOLET in *MEDICINAL HERBS.*

VIOLA RUST.—See *DISEASES OF PLANTS.*

VIOLA SPECIES.

Only a brief reference to these is necessary, for the culture of them is fully dealt with in the preceding and subsequent articles. The most important species are probably *V. cornuta*, *V. lutea*, and *V. tricolor*; from these the Violas of to-day have been derived. Then we have *V. odorata*, the SWEET VIOLET, and the parent of our Violets. Other species of some importance include *V. canina*, the DOG VIOLET, *V. hederacea*, the NEW HOLLAND VIOLET, and *V. sylvestris*, the WOOD VIOLET. A special word of praise must be given to *V. cornuta* and *V. gracilis*, both of which are useful for rockwork.

UP-TO-DATE SELECTIONS.

Viola Arkwright Ruby.—Ruby-crimson. *V. cornuta Pink Pearl.*—Rose-pink. *V. Primrose Bedding.*—Large yellow.

VIOLET.—See *MEDICINAL HERBS, VIOLETS,* and *WATER GARDEN: PLANTS FOR THE.*

VIOLET CRESS (*Ionopsidium acaule*, Nat. Ord. Cruciferæ).—This is one of the most delightful of hardy annuals, and it is seen at its best when filling a little shady recess in a fairly moist position in the rock garden. Sow in spring and thin the seedlings to a few inches apart; after which it will sow itself so freely that there is no difficulty in securing sufficient plants from year to year. It is a miniature plant of dainty and cheerful appearance, producing blue flowers freely all the summer. There is also a white variety of similar height to the blue sort, namely, 2 ins. Modern botanists now place the plant under the genus *Cochlearia*.

VIOLET WILLOW (*Salix daphnoides*). See *TREES*.

VIOLETS (Nat. Ord. Violaceæ). These grow in most of the temperate parts of the world, though many, especially in the new world, have no scent, or very little. They are not particular as to soil, for the writer of this article has had them do well on Bagshot sands, London clays, and the chalky soils of Hants and Dorset. They all seem to be very tenacious of life, as they will keep alive year after year, even when grown wild among grass.

The finest flowers are to be had on deeply worked loams, but even newly broken heath land that has had a liberal dressing of farmyard manure, and a thick coating of road-sidings, will give a remunerative return for the investment.

The writer grows many acres, the majority of which land is only deeply ploughed; but the best results are where the soil is deeply forked up and broken small with a new digging-fork, a liberal dressing of forty tons of manure to the acre being allowed. One thing is important: the manure must be evenly incorporated with the soil or the crop will be uneven; see that no large lumps of soil are left beneath the surface for the roots to come into contact with.

Planting.—All the large flowering singles should be planted 15–18 ins. apart, in the lines 2 ft. asunder, using single crowns with all lateral growths cleared off. The strong tips of runners soon root if planted in March and April, and if stock is short, the long runners cut into pieces and dibbed firmly in the soil, soon root and make nice plants, which will give some of the very largest blooms in autumn and winter, though they never grow into such huge plants as the strong, vigorous growths that come up from the base of old plants. All must be made firm when planting. All strong growers such as *La France* and *Princess of Wales* are planted in this way.

At our Violet farm we plant the Doubles or Parmas in the same way putting the crowns 12 ins. apart in the lines, and leaving the rows 2 ft. asunder, as it enables a wheel cultivator and hoe to be kept going up and down the lines, to keep down weeds and aerate the soil, which last is an essential point in good cultivation. If the surface soil is allowed to get hard and baked, the plants will stand still and will never be remunerative.

Summer Management.—Till July there is nothing much to do, save to keep the plants scrupulously clear of weeds. All the strong-growing, single varieties will then, however, begin to develop a lot of lateral growths from the main crown, and these should all be pulled off in order to enable the crown to build up its flower buds. We find that with such varieties as *La France* and *Princess of Wales*, one thinning, if done at the end of July, is sufficient; but others, such as *Luxonne* and

Ascania, are best done twice, since these make so many runners and in consequence do not develop such strong stems if allowed to spread out and grow as they would.

Doubles should be gone over three times; they then add to the centre crown, and produce the flowers early from August until May. They are not so easily grown as singles, it is true, nor are they so much sought after, but they are more productive under glass in mid-winter than are singles. If grown at all, they must be made to move on vigorously, or they will never pay the grower.

Lifting for Winter Protection.—All Double varieties such as *Louise*, *Brazza*, *Aster*, *Arthur*, *Parme*, etc., are best grown under glass in winter. They give a great quantity of flowers in autumn, it is true, but if grown out of doors frost stops them very early, and in many cases severely injures if not actually destroys them. For flowering in winter, plant them in frames or in side-borders of tomato-houses. To do this, nick out a trench about 6 ins. deep and somewhat sloping, placing the plants in the trench with a good ball of earth round them. All leaves will then lie away from the planter, and the soil can be levelled in with the spade and trodden firmly. The soil is then smoothed over again with the spade and made uniformly level, and another nick is made about 8–9 ins. from the first, and so on, till the whole of the frames or house-borders are full. After planting they must be well swamped with water, and kept always moist by a fine-rosed watering-can until new roots are made.

Harvesting the Flowers.—Flowers should be gathered with their full length of stem and tied in bunches of fifteen or twenty blooms. All flowers should be loosely arranged and a few leaves placed round each bunch rather low down the stems and tied tightly, since they take up moisture when loosely tied together. Six of the bunches may then be tied into one, to make a nice bouquet.

Varieties.—The following are strongly recommended:—

For General Use:—*Singles.*—Ascania (a sort with pointed purple-blue petals); La France (round blue petals); and Princess of Wales (a very large, long-stemmed sort, with blue flowers).

Doubles.—Conte de Brazza (pure white); Marie Louise (dark blue with white centre); Mrs Arthur (dark blue with stiff stems); and Swanley White (pure white).

For Market Purposes.—Varieties for this purpose are somewhat of a gamble, as in some years colour plays an important part. Sometimes there is a large demand for light blue, while in other years the main sale may be for dark blue and reddish-mauve sorts. We plant the following sorts most extensively:—

Singles.—Ascania (purple blue); La France (dark blue); Luxonne (purple blue); Mrs David Lloyd George (large, with petals of various colours); and Prince of Wales (dark blue).

Doubles.—Coleroonan (light blue); De Parme (mauve blue); Marie Louise (dark blue with white centre); Mrs Arthur (desirable blue); Mrs J. J. Astor (purple mauve); and Swanley White (pure white).—J. J. K.

VIOLETTAS.—See *Viola.*

VIPER.—See *Snakes.*

VIPER'S GRASS (*Scorzonera.* Nat. Ord. Compositæ).—The plants of this name are hardy biennials or perennials of no great value, but worthy of culture when the collection is extensive. They bear yellow flowers from May to August, on plants 1–2 ft. high. Probably the most important species from a floral point of view is *S. mollis*, the Soft Viper's Grass. *S. hispanica* is not grown for its flowers, but for its roots, which are boiled similarly to Salsafy. Its culture is dealt with in the article on *Scorzonera*.

VIRGINIA CREEPER (*Vitis quinquefolia*).—See *Climbing and Trailing Plants*.

VIRGINIAN POKEWEED or POKEBURR (*Phytolacca decandra*).—See *Phytolacca*.

VIRGINIAN STOCK (*Malcomia maritima*, Syns. *Malchomia* and *Malcolmia*. Nat. Ord. Cruciferæ).—This is a very popular annual, the most popular of all in the genus, though other species such as *M. bicolor* (pink and yellow), *M. Chia* (lilac-purple), and *M. littorea* (bright purple-pink) are sometimes grown. It and the other hardy annual species are all readily raised from seeds sown out of doors in March, but successional sowings are necessary if a long flowering period is desirable. As the seeds are very small a mere covering of soil is sufficient; and the seedlings should be thinned out to about 4 ins. apart. Virginian Stock may be had in a range of colour from white through mauve to purple and crimson. It flowers throughout the summer, and grows about 8 ins. high.

VIRGINIAN TOBACCO (*Nicotiana Tabacum*).—See *Tobacco Plant*.

VISCARIA.—Now included in the genus *Lychnis*.

VITIS.—See *Climbing and Trailing Plants* and *Vines*.

VITRIOL.—See *Weed Killers*.

VITRIOLATED BONES.—See dissolved or vitriolated bones under Phospho-nitrogenous Manures in *Manures*.

VOLUMES.—See *Arithmetic and Gardening*.

VULNERARIA.—Now included in the genus *Anthyllis*.

VULPIA.—Now included in the genus *Festuca*.

VUYLSTEKEARA.—See *Orchids*.

WAHLENBERGIA (Syn. *Edraianthus*, TUFTED HAREBELL. Nat. Ord. Campanulaceæ).—These tufted plants with grassy leaves are all good rock garden plants, and may be easily raised from seeds sown in gentle heat in March.

Wahlenbergia dalmatica. — This biennial bears tufts of grassy leaves. Flowers rich violet in dense heads. Site sunny. Soil gritty, well drained. Flowering Period, June to August. Height, 3 ins.

W. graminifolia.—This biennial bears tufts of downy leaves. Flowers pale blue. Site sunny. Soil gritty. Flowering Period, May to July. Height, 3 ins.

W. Pumilio (Syn. *W. pumiliorum*).—This perennial bears tufts of very short silvery leaves. Flowers lilac or rosy-lilac. Site sunny. Soil rocky. Flowering Period, May to July. Height, 2 ins.

W. serpyllifolia (THYME-LEAVED HAREBELL).—This perennial bears tufts of narrow shining green leaves. Flowers deep violet-blue. Site sunny. Soil gritty. Flowering Period, June to August. Height, 3 ins.

W. vincaeflora (Syn. *W. gentianoides*).—This plant bears tufts of slender stems. Flowers deep blue. Site, half-shade, Soil rich gritty loam. Flowering Period, May to July. Height, 1 ft.

WAHOO (*Ulmus alata*).—See *TREES.*

WAITZIA.— See *EVERLASTING FLOWERS.*

WAKE ROBIN (*Trillium grandiflorum*).—See *TRILLIUM.*

WALKING FERN (*Scolopendrium rhizophyllum*).— See *FERNS AND FERN GARDENING.*

WALKS.—See *GARDEN PATHS.*

WALL BUILDING. See Editorial Note in our article on *GARDEN WALLS.*

WALL CRESS (*Arabis albida*).— See *ARABIS* and *CRESS.*

WALL GARDENING.

The healthy interest taken in the many beautiful mountain plants we comprehensively embrace within the term "Alpine" has led to an eager inquiry for information in respect of their cultivation and treatment under garden conditions. The most natural and also the most picturesque way of growing Alpines is unquestionably in a properly constructed rock garden. This is not usually a difficult problem in large gardens, but with those of moderate extent and especially with small gardens in or near large cities, it is not always a simple matter to combine variety with a near approach to pictorial effect, for the reason that a large number of the most effective rock plants are somewhat aggressive when placed in company with small growers, and unless close attention is paid to them in the growing season, they are most likely to crowd and smother them out. This difficulty is readily overcome, even in the smallest garden, by surrendering the rock garden to the choicest and rarest subjects, supplementing this by a dry-wall for the more vigorous and showy subjects. The advantage of the last named is that it takes up small space, it readily accommodates a great variety, and it introduces a pictorial feature of no mean order to the garden. Then again, dry-walls may have a place in gardens where space cannot be found for an elaborate rock garden; in such cases the most acceptable form is that of a retaining-wall, as then it supplies an apparent reason for its existence, and the mass of soil that the wall supports yields a constant supply of moisture, so that even in the hottest summer the roots do not suffer from drought. Positions which suggest reasons for the existence of retaining-walls are when supports for terraces are required, or they may be introduced to force up the levels in forming a "sunk" garden, or the margins of a formal water-lily garden. Again, low walls radiating from the main paths, the borders level with the wall tops, may be introduced into many gardens, and with old rectangular stone slabs forming the pathways an extremely interesting garden results. Dry-walls may also be raised on level ground to form an enclosure much in the way we follow in planting hedges. In this case we take, for example, a wall that will be 5 ft. high when finished; this will require a base 3 ft. wide, and by allowing 2 ins. of "batter" on each side to every foot in height, the top will be 16 ins. wide when finished. In districts much subject to drought, the top should at least be 2 ft. wide, so that in a wall 5 ft. high the base would be 3 ft. 8 ins. wide. This gives a large body of soil to resist the drying influences of sun and air, while the increased width of the top allows artificial watering to be carried out with greater ease and with marked benefit to the plants. A wall of this nature differs from the retaining-wall in that both faces can be planted, as well as the top, and it is scarcely possible to conceive it as other than a charming addition to the garden.

The best material for erecting dry-walls is rough, unhewn stone direct from the quarry; blocks varying in size and thickness and of unequal lengths are to be preferred, and if the stone shows stratification so much the better. A dry-wall that is a prominent feature in the garden design should have the best stone procurable. For low walls it is often most expedient to use stone formed from broken paving slabs, or waste pieces from the local builder's yard; the only disadvantage is, that it takes longer to build; for all practical purposes the result is similar, as plants do equally well, and once they come to maturity the stone is largely hidden by them.

Dry walls may also be built with

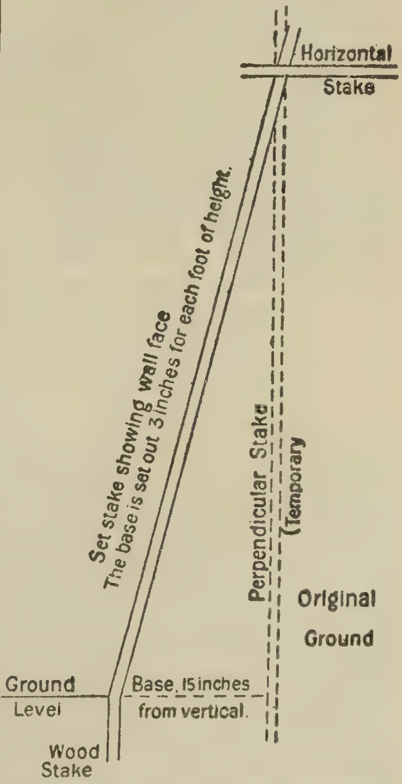


FIG. 1.—Method of finding position of wall face

well-burnt bricks; these require exceptional care in bedding; they are best arranged laid flat, with the narrow end exposed,—this is what builders call "headers." With bricks, both joints and courses are of necessity very small, as the first object in all building is to secure stability of the structure, and this is readily endangered by leaving large joints and wide courses when dealing with bricks.

Construction.—In setting out a dry-wall the actual front edge where it meets ground-level is first marked out. Drive in a stout wooden stake at each end, perpendicular to the ground line (see Fig. 1). Ascertain the extreme height of the wall, and mark the perpendiculars at the given height. Now drive in a set stake on the higher ground above, where the wall top will come, and bisect the perpendicular at the point marked, nail these together, and make rigid. To find the "batter" of the wall face, take the number of feet in height, multiply by the factors three or four, expressing the result in inches. For example, a wall 7 ft. 6 ins. would give respectively $7\frac{1}{2} \times 3 = 22\frac{1}{2}$ ins., or $7\frac{1}{2} \times 4 = 30$ ins. This distance is set off from each perpendicular *at ground level*, and another stake is set up from this point and connected with each perpendicular at the wall top, thereby forming a diagonal line. This gives the set-back or "batter," and with a builder's line stretched between, the courses can be laid with ease and precision. The idea is illustrated in Figs. 2 and 3. Walls of irregular outline can be dealt with in the same way as straight walls; in this case, however, additional stakes should be used at all outstanding points. Having set out the wall face, proceed to open a shallow trench to receive the first layer of stone, and when the soil is heavy and water trouble is suspected, place a few land drain-pipes in the footing, some 12–15 ft. apart, and cover the inner end with enough ballast to carry off excessive water.

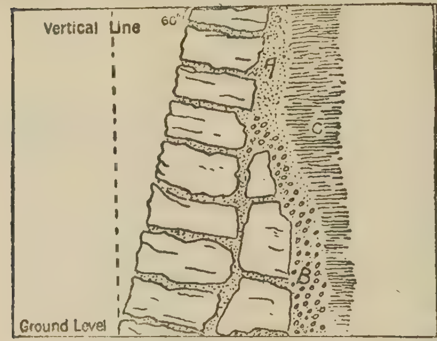


FIG. 2.—Section showing stones laid to form a straight wall face.

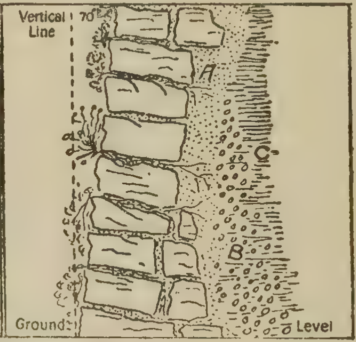


FIG. 3.—Section showing stones laid to form ledges.

NOTE.—Each stone is laid to dip inwards.

A—Special soil. *B*—Rough material to act as drainage. *C*—Natural soil.

Arrange each of the wall stones so that the inner edge dips forward; make each stone quite rigid and firm by ramming with soil all joints and crevices behind. When one course is laid, add a layer of prepared soil and proceed with second course, crossing or "bonding" the joints, making firm with soil as before, this process being continued until the wall is complete.

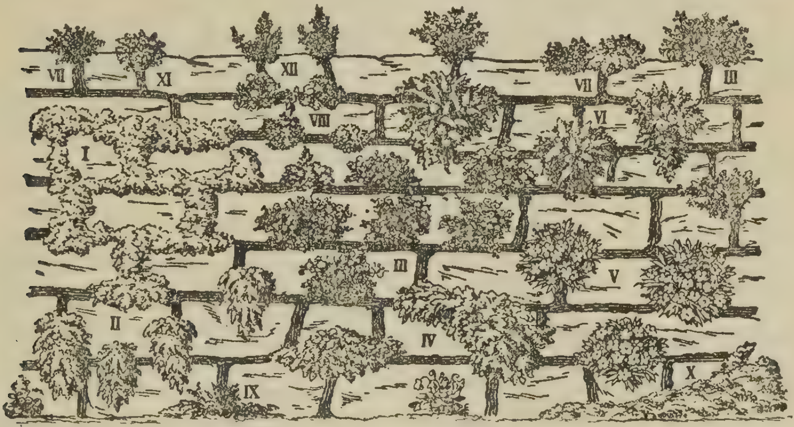


FIG. 4.—Showing plant grouping in dry-wall.

I. Arenaria balearica.
II. Aubrietia Dr Mules.
III. Campanula muralis, Syn. portenschlagiana.
IV. Achilea umbellata.
V. Dianthus caesius.
VI. Saponaria ocymoides splendens.
VII. Hypericum Coris.
VIII. Saxifraga longifolia.
IX. Veronica rupestri.
X. Hutchinsia alpina.
XI. Campanula Pumila.
XII. Lithospermum Gastoni.

Planting.—This should be done during the building, as then larger plants can be used, and the roots can be led well behind the wall face. To plant effectively, a rough drawing of the main groups should be prepared beforehand (see Fig. 4); this eliminates haphazard work, and when the wall is finished, we do not find robust and vigorous varieties mixed up indiscriminately with weaker or more fragile sorts.

Aspect does not materially affect dry-walls except in the selection of suitable plants; positions open to sun and air should always be favoured, and overhead shade from either trees or buildings should be avoided, likewise proximity to trees like Elm, Chestnut, Beech, etc., as the roots of these soon overrun and exhaust the better soil in the wall.

Once the dry-wall is planted it requires little after attention; the first season it is advisable to spray the wall face morning and evening, with clear water delivered from a fine-rosed water-pot, care being taken not to wash the soil from the joints. As soon as growth is well advanced this may be discontinued. Then in regard to any vacancies that occur in the wall, these are readily made good either by using rooted cuttings, seedlings, or even seed itself; indeed, any or all of these can be used to plant the wall after building, when it is not practicable to plant while building is going on. In the case of seed, the best results follow by mixing the seed with about four times its bulk of good potting soil, sowing tiny pinches in the courses and joints where a plant is desired. With seedlings and rooted cuttings employ a sharp pointed tool to open spaces to admit the roots, then fill in lightly with good turfy soil; with seed and small plants spraying with clear water is imperative until the plants are well established.

The soil employed for dry-walling calls for special mention, as, unlike in the rock garden, it is impossible by digging up the plants to renew it. Soil from chalk land gives the best results; in default of this, use good turfy loam, that has been stacked long enough to kill all grass life, in the proportion of—loam 4 parts, leaf-soil 1 part, crushed chalk or old mortar 1 part, and ½ part of sharp sand, the whole to be mixed together before using. Use this compost entirely in bedding the stones and filling the joints, and it may also be added behind the wall, mixing it with the soil *in situ* as the work proceeds.

To those who take up the cultivation of alpines seriously, the dry-wall has more to recommend it than its pictorial aspect; it offers a home for those capricious children of the mountains that are so sensitive to the humidity of our climate in winter, and compares favourably with the rock garden, as here no artificial contrivances are required to protect the plants. Grown in the dry-wall they are stronger in spring, break away earlier, and the harvest of blossoms is the most generous one can conceive. This applies generally and is most marked among alpine plants having grey or woolly leaves.

WHAT TO GROW.

LIST OF PLANTS FOR SHADY WALL GARDENS.

Adonis vernalis.
Anemone apennina blanda nemorosa in variety.
Arenaria balearica caespitosa.
Asarum europaeum.
Astrantia carniolica.
Campanula carpatica, pusilla.
Cardamine trifolia.
Cyclamens in variety.
Dicentra formosa.
Epimediums—for wall foot.
Erinus alpinus in variety.
Erodium Reichardi.
Erythroniums.
Funkias—for wall foot.
Galax aphylla (no lime in soil).
Haberlea rhodopensis (no lime in soil).
Hepatica angulosa triloba.
Maxus Pumilio.
Mentha Requieni.
Myosotis in variety.
Nierembergia rivularis.
Omphalodes verna.
Ourisia coccinea (no lime in soil).
Oxalis enneaphylla (no lime in soil).
Polygala Chamaebuxus purpurea.
Primula capitata, farinosa, frondosa, latifolia, rosea, viscosa.
Ramondia all kinds.

FERNS

Adiantum pedatum.
Allosorus crispus.
Asplenium Ruta-muraria, Trichomanes cristatum.
Blechnum spicant cristatum.
Ceterach officinarum, crenatum.
Cystopteris alpina (Regia), fragilis montana.
Lastrea montana, The lypteris.
Lomaria alpina.
Polypodium calcareum Dryopteris, Phegopteris, vulgare in variety.
Polystichum Lonchitis, munitum.
Scolopendrium vulgare in variety.
Woodsia ilvensis, obtusa.

PLANTS FOR WALL GARDENS IN SUN.

Acaena Buchanani.
Acantholimon glumaceum.
Achillea argentea, Kelleri, rupestris, umbellata.
Æthionema coridifolium, grandiflorum.
Alyssum alpestre, montanum, saxatile citrinum fl. pl.
Androsace carnea, lanuginosa, sarmentosa.
Anthyllis montana.
Aquilegia glandulosa.
Arabis albida fl. pl., aubrietiodes.
Arenaria montana, tetraquetra.
Armeria all kinds.
Artemisia brachyphylla splendens, pedemontana.
Asperula hirta, nitida.
Aster alpinus.
Aubrietias all varieties.
Calamintha alpina.

Campanula pulla, pulloides, garganica, G. F. Wilson, muralis, carpatica, pusilla, Steveni, turbinata, haylodgensis, Profusion.
Cheiranthus Allionii.
Dianthus alpinus, arenarius, caesius, deltoides, fragrans, frigidus, graniticus, Lereschei, microlepis, neglectus, petraeus, plumarius, suavis.
Draba aizoides, dedeana.
Dryas octopetala.
Edralanthus dalmatica, pumiliorum, serpyllifolius.
Erodium amanum, chrysanthum.
Erysimum pulchellum.
Erythraea diffusa.
Gentiana acaulis.
Geranium argenteum, cinereum, Traversi, lancastriense.
Geum montanum.
Gyosophila cerastoides, repens.
Hutchinsia alpina.
Hypericum Coris, fragile repens,, reptans.
Iberis garrexiana, gibraltarica, Little Gem, Tenoreana.
Iris stylosa.
Jasione Jankae.
Leontopodium alpinum, sibiricum.
Linum narbonense, perenne.
Lithospermum Gastoni, graminifolium, prostratum.
L. prostratum Heavenly Blue.
Lychnis Viscaria splendens.
Morisia hypogaea.
Nepeta Mussini.
Œnothera riparia.
Onosma tauricum, albo-roseum.
Papaver alpinum, nudicaule.
Phlox amoena, reptans (verna), ovata, subulata all varieties.
Phyteuma comosum, orbiculare.
Plumbago Larpentae.
Potentilla ambigua, nepalensis, Willmottiana.
Primula calycina, marginata.
Prunella webbiana.
Pterocallis pyrenaica.
Saponarie ocymoides splendens.
Scabiosa Pterocephala.
Sedum brevifolium, corsicum, dasyphyllum, kamtschaticum, pulchellum, rupestre, spurium.
Sempervivum arachnoideum, Laggeri, montanum.
Silene alpestris, Elizabethae, Schafta.
Stachys corsica, lanata.
Tabacetum argenteum.
Thymus lanuginosus, micans, Serpyllum in variety.
Tunica Saxifraga fl. pl.
Veronica Bidwillii. incana, rupestris.
Viola gracilis.
Zauschneria californica.

SAXIFRAGES FOR WALL GARDENS.[1]

S. aizoon balcana, Gaudini, la gravenaa, minor, rosea.
S. Andrewsii.*
S. apiculata.
S. aspera,* bryoides.
S. Boydii alba.
S. burseriana gloria.
S. cochlearis major.
S. Cotyledon pyramidalis.
S. crustata cuneifolia.*
S. decipiens.*
S. Elizabethae.
S. exarata.*
S. Geum crenata,* elegans.
S. granulata fl. pl.*
S. hypnoides.*
S. lingulata Bellardi, lantoscana, superba.
S. longifolia.
S. macnabiania.
S. montavoniensis.
S. muscoides,* and many hybrids.
S. oppositifolia alba,* splendens.
S. retusa.*
S. Salomoni.
S. umbrosa.*
S. Wallacei.*

T. S.

It should be noted that the names given in the above article are in many cases those by which they are most commonly known to gardeners, and thus do not necessarily correspond with the newer classification of Kew.—EDITOR.

WALL or FENCE TREES : Pruning of.—See *PRUNING FRUIT TREES.*

WALL PLANTS FOR CITY GARDENS. See *TOWN AND CITY GARDENING.*

WALL TREES : Aspects for.—See *FRUIT CULTURE : HARDY.* There is a reference to the matter also in *GARDEN WALLS.*

WALLFLOWER MILDEW. — See *DISEASES OF PLANTS.*.

WALLFLOWERS (*Cheiranthus Cheiri.* Nat. Ord. Cruciferæ).—Seeds of Wallflowers may be sown outdoors from May to July ; but to get good plants they should be sown thinly in lines, 12 ins. apart, during May, and transplanted when about 1–2 ins. high. If the ground is already dug, tread it firmly all over, then dibble the seedlings into lines 12 ins. apart, and 6–9 ins. in the lines. The treading will ensure dwarf bushy plants, capable of flowering profusely the following May; or from autumn till spring in the case of the extra early Wallflowers. They should be transferred to their flowering positions as early in October as possible.

---

[1] Asterisk denotes species or varieties that succeed in part shade.

Wallflower Varieties.—We give below a selection of the best sorts:—

	Ins.
Blood Red.—Blood red. Spring.	12
Cloth of Gold. — Golden-yellow. Spring.	12
Darkest of All.—Maroon. Spring.	12
Eastern Queen.—Apricot, changing to rosy-pink. Spring.	12
Ellen Willmott. — Pure ruby. Spring.	12
Faerie Queen.—Pale citron yellow. Spring.	12
Fire King.—Vivid orange. Spring.	15
Giant Blood Red.—Large, blood red. Spring.	15
Giant Vulcan.—Brilliant crimson. Spring.	15
Giant Yellow. — Rich yellow. Spring.	15
Golden Monarch.—Golden-yellow. Spring.	12
Harbinger.—Brown. Winter and spring.	12
Ivory White.—Ivory white. Spring.	12
Linnaeus.—Creamy yellow, passing to pure white. Spring.	16
Orange Bedder. — Rich orange, shading to apricot. Spring.	9–12
Primrose Monarch.—Pale yellow. Spring.	12–15
Purple Queen.—Rich purple or ruby. Spring.	12
Rosy Gem. — Rose carmine. Spring.	15
Vulcan. — Brilliant crimson. Spring.	9

The following, *Dwarf Red*, *Dwarf Yellow*, *Early Flowering Vulcan* (crimson), *Phœnix* (chestnut brown), *Primrose* and *Yellow Phœnix*, are all 9 ins. high; they flower from autumn till spring. All of these are named varieties of Sutton's early flowering strains. *Improved Double* (18 ins.) and *Double Dwarf Branching* (9–12 ins.) include many colours.

J. F.

WALLICHIANUM SUPERBUM.—See *Lilium speciosum sulphureum* in *LILIES.*

WALLS.—See *GARDEN WALLS.*

WALLS: BUILDING OF.—See Editorial Note to our article on *GARDEN WALLS.*

WALLS: ROSES FOR.—See under ROSES FOR WALLS in *ROSES FOR ALL PURPOSES.*

WALNUT.—See *NUT CULTURE.* See also JUGLANS in *TREES.*

WARNINGS ON WEED KILLERS.—See *WEED KILLERS.*

WART CRESS.—See *CRESS* and *SENEBIERA.*.

WART DISEASE OF POTATOES.—See *POTATO DISEASES.*

WARTED GOURD.—See *ORNAMENTAL GOURDS.*

WASATCH ROSE (*Rosa nutkana*).—See *ROSE SPECIES.*

WASHING SODA. — See SODIUM CARBONATE IN *SODA AND SODIUM COMPOUNDS.*

WASHINGTON THORN (*Crataegus cordata*).—See *TREES.*

WASP NETTING.—See under PEACH NETTING in *GARDEN NETTING.*

WASPS.—See article on *INSECT PESTS.*

WASTE HAIR.—See ORGANIC PRODUCTS under NITROGENOUS MANURES in *MANURES.*

WATER.—See Editorial Note at the end of our article on *GARDEN GEOLOGY.*

WATER ASH (*Fraxinus caroliniana*).—See *TREES.*

WATER AVENS.—A popular name for *Geum rivale.* See *GEUM.*

WATER BARROWS.—See *GARDEN APPLIANCES.*

WATER-BEARING ROCKS.—See *GARDEN GEOLOGY.*

WATER BETONY (*Scrophularia aquatica variegata*[1]).—See *FIGWORT.*

WATER CALTROPS (*Potamogeton densus*).—See *POTAMOGETON.*

---

[1] The Kew Hand-list does not refer to the pretty form *variegata.*—EDITOR.

SWEET SCENTED WALLFLOWERS

WATER CRESS.—See *CRESS* and *SALAD PLANTS.*

WATER DROPWORT.–See *ŒNANTHE.*

WATER ELM.—See the genus ZELKOVA in *TREES.*

WATER GARDEN, THE.

Among the more modern developments of horticulture the water garden has taken an important place. It does not matter whether the site is of large extent, as of lake and river, or quite small as in such a place as may have only a trickle of water artificially supplied; either of these, and everything between, can be adapted for good use in the display of the many beautiful plants of the water and waterside. The diversity of circumstances and way of treatment may be as great as the nature and conditions of the place, but as in all good gardening the natural possibilities of the site have first to be considered and respected, for it is out of these that is formed, in the mind of the competent designer, the conception of the best form of treatment. The nature of the site will govern the main distinction, which is, whether the place is suitable for a free kind of planting on natural lines, or whether, in the case of a restricted area and where it will necessarily be near buildings, it will have to be of a purely formal character. In the first case let us suppose that the water supply is a natural one of pond and stream on the extreme outskirts of garden ground. Here, if the water has a naturally good edge, that is, an edge that is easily accessible and is not much above the water-level, all that is needed will be to clear adequate spaces for planting, leaving the natural growth, especially when it has any suitable character as of Sedge or Bur-reed, undisturbed. There are plants for all degrees of moisture. The noble water lilies for water of some depth, the fine things that thrive in quite shallow water, such as Water Plantain (*Alisma*), the great Water Dock (*Rumex*), some of the Irises, namely, the Yellow Flag, and the Japanese *Iris laevigata,*[1] Buck-bean, the Arrowheads, and the Flowering Rush (*Butomus*). Then there are the many plants that, though in no sense aquatics, rejoice on the banks of streams or ponds, where their roots can always feel the cool moisture of water soaking through the ground. Here may be grown many of the Spiraeas: the double form of our own Meadow Sweet (*Spiraea venusta*), with tender pink bloom and much the same habit; the larger *S. Aruncus* of Alpine torrents, with its handsome foliage and beautiful plumes of cream-white flowers; several of the tall Meadow Rues (*Thalictrum*); the rosy Willow Herb (*Epilobium*); and the crimson Loosestrife (*Lythrum*), the great yellow Loosestrife (*Lysimachia*), and its smaller relative the Creeping Moneywort. Here also is the place for the tall Yellow Mimulus and for Globe Flowers (*Trollius*); the Marsh Marigold (*Caltha*), with the yellow Himalayan Primrose (*Primula sikkimensis*) having nodding sulphur bells, and the Japanese Primrose (*Primula japonica*), of a rather rank magenta colouring in the type form but with varieties of good white and various degrees of pleasant pink colouring. Then there is the Siberian Iris both purplish-blue and white, with some garden improvements, all happy in damp ground, and *Saxifraga peltata* with its great roundish leaves.

Where spaces are large, good use can be made of the great Cow Parsnip (*Heracleum*); the more recently introduced *H. mante-*

---

[1] Or *Iris Kaempferi.*—EDITOR.

gazzianum is an improvement on the older *H. giganteum.*[1] The still larger foliage of the giant Gunneras requires cautious placing as it is almost out of scale with ordinary vegetation. In waterside planting, Ferns should not be forgotten. The best for general use are the Royal Fern (*Osmunda*), the graceful Lady Fern, and the Dilated Shield Fern.

The shape of the bank next the water is well worth considering. It is often of a steep, rounded form that seems to plunge suddenly into the water. Such a bank is far from pretty. It gives a sense of insecurity and does not admit of convenient planting. Where there are such banks it is well worth while to make a complete alteration and to shape the ground afresh, so as to leave a level grassy pathway some 7 ft. wide, only raised enough above the water to be sound and dry; thus providing easy access, security, and the best opportunity for good planting. This is shown in Fig. 1.

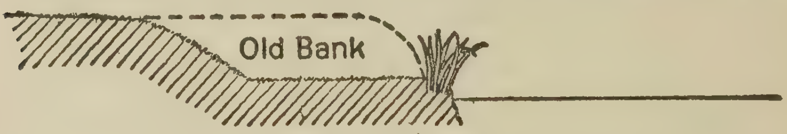


FIG. 1.

A natural running stream, especially if it flows fast over a shallow pebbly bed, with sides either naturally near the water-level or purposely made so, is one of the very best settings for beautiful plants. It can often be so arranged that the path shall cross it from time to time, either by well-set stepping-stones or by a simple plank or log bridge. But it is most desirable, especially in places that have a natural character, such as the edges of ponds and streams, that a wise restraint should be observed about the numbers of different plants that are to be seen at a glance. If many different kinds are seen together, restful enjoyment of their beauty will be lost. One good thing at a time in fair quantity, or two at most, is the better way, as, for example, Double White Meadow Sweet with Water Forget-me-not, and to let this go on for some yards, and then, after an interval, to pass on to some other grouping, either of one kind of plant, or two in combination. [This point needs emphasising. Many water gardens are completely spoilt by having too many plants showing at the same spot.—ED.] In stream planting also the finer of the hardy Ferns should not be overlooked: the Royal Fern (*Osmunda*), the Lady Fern, and the Dilated Shield Fern. These are best seen on the further side of the stream; in fact, the view of many of the plants will be better and more comprehensive from the opposite bank. In this way the stream has the advantage of the pond, unless the pond is quite a small one.

It sometimes happens that the only available water is a mere trickle at the bottom of a deepish ditch. When this is the case, and when labour can be expended, the sides can be cut down as before suggested and the spare soil thrown out to form raised banks; one side having the space for a path only a little above water-level, while the other is varied by taking the form of an easy bank beginning at the water's edge. The little stream may also be widened and its bed floored with small stones or flattish slabs. The path and the accompanying treatment of the banks can move from side to side so as to give different aspects and points of observation. If it is desired that the place shall be enclosed from outer view, the banks formed by throwing up the waste soil should be planted with some kind of bushy growth, for preference Holly, with Whitethorn, Blackthorn, Spindle Tree, and other shrubs of like character; then the bank on the path side would be an admirable place for growing some of the better kinds of wild Blackberry.

---

[1] Now known as *Heracleum villosum.*—EDITOR.

When the water garden is in a more restricted space, or where, as is often the case, it is desired to have water plants near the house or in close connection with formal gardening, it will take the form of a built tank, symmetrical pool, or miniature canal; or a series of tanks may be connected by a narrow rill that may be stepped over. The edges will either have a flat pavement or a raised curb of wrought stone. There is sometimes hesitation about having a tank deep enough for water-lilies on account of danger to children, but there is a way of building the outer yard or two of the tank that minimises the danger and is in any case desirable. This is to have the outer portions only a foot deep for a yard at least from the edge (see Fig. 2). This also provides a way of having plants in pots that thrive in shallow water; such as the noble Water Plantain and Arrow-heads; or, if the wall to the deeper level is carried up so as to retain 4–5 ins. of soil for the plants to root in, it will be all the better. In all cases where water is employed in conjunction with masonry, as in such tanks or rills or in fountain basins, it is important that the water-level should be placed high and carefully maintained. Nothing is more common or has a more slovenly and uncared-for appearance than a half-empty tank. If it is used for dipping, and the supply is not automatically continuous, it should be turned on at once.

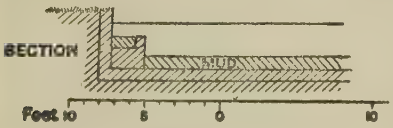


FIG. 2.

The gardens of the Italian Renaissance show some of the finest examples of the use of water in connection with garden architecture; but it rarely happens in our islands that there is an opportunity of using such vast masses of water; for there are in Italy examples where whole rivers were turned into the garden to form rushing cataracts, water stairs, water theatres, and endless arrangements of fountain, rill, and pool; lasting monuments to the inventions of the designer and the resource and skill of the hydrostatic engineer.—G. J.

WATER GARDEN: PLANTS FOR THE.

There are a great many beautiful plants suitable for the water garden which are of easy culture, and below we deal with the most meritorious:—

Arrow-head (*Sagittaria.* Nat. Ord. Alismaceæ).—No river or pond side is complete without an example of this plant, which bears attractive, glossy, arrow-shaped leaves. It will live planted in water a foot deep, or where currents only lave its elegant stems. Plant in March, enclosing the roots in a thin cardboard box which will rot away before long, filling the box with a compost of loam, clay, sand, and old manure, adding a heavy stone to keep it down on the bed of pool or stream. The best sort is—

Sagittaria variabilis. (Syn. *S. japonica*).—This bears white flowers from July to October. Height, 2 ft. Its variety, *flore pleno*, is double white.

Bamboo (*Bambusa.* Nat. Ord. Gramineæ).—The sorts suitable for the water garden are dwarf plants and trees, delighting in rich, damp soil, but liking sunshine. They are apt to be spoilt by cold cutting winds, but may be successfully planted in late March or April. We recommend the following:—

Bambusa Fortunei aurea.—This has golden variegated foliage. Height, 3 ft.

B. Metake.—A foliage plant with greenish-yellow florescence in August. Height, 12 ft. The variety *variegata* has cream and green foliage.

Cape Pond Flower (*Aponogeton distachyum.* Nat. Ord. Naiadaceæ).—This is the fragrant white "weed" that beautifies so many ponds, rivers, lakes, and river backwaters during late summer, continuing even into winter. It will succeed in sun or shade, but must be kept severely in check, if near water-lilies. It is propagated by root division and planted in the same way as the Arrow-head, or in sunk pots in water 1–3 ft. deep. If the greater depth exists, a mound of stiff soil should first be made, so as to place the roots only just below the level at the start. The hillock will be washed away as the plants develop strength. Good sorts for the water garden include—

Aponogeton distachyum. — This bears white, Hawthorn-scented flowers from April to October. Height, 9 ins. The variety *roseum* has pink and white flowers.

Creeping Jenny (*Lysimachia Nummularia.* Nat. Ord. Primulaceæ).—A first-rate creeping or trailing plant for wet ground, with yellow flowers, blooming from April to August. Height, 3 ins.

Crowfoot (*Ranunculus.* Nat. Ord. Ranunculaceæ).—The kinds of Crowfoot mentioned here, all of which are hardy and luxuriant both in foliage and flowers, need but to be planted in November or March, and supported by rustic stakes, with ties of green tape, to prepare a grand flower show during spring and summer. *Ranunculus aconitifolius flore pleno* is familiar to most people as Fair Maids of France, and will become quite a bush, covered by massed heads of snowy rosette-shaped blooms. *Ranunculus acris plenus* is the old-fashioned Bachelor's Buttons, and can only be seen in perfection where the roots have a deep run of moist soil, though it is often starved in ordinary borders. *Ranunculus Lingua*, a sort with very fine leaves, requires planting in the mud just beside or beneath the water in November. We give a brief description of the three sorts below:—

Ranunculus aconitifolius fl. pl.—This bears white flowers from May to June. Height, 2½ ft.

R. acris plenus.—This bears bright gold flowers from April to September. Height, 3 ft.

R. Lingua.—This bears yellow flowers from June to July. Height, 4 ft.

Day Lily (*Hemerocallis.* Nat. Ord. Liliaceæ).—Day Lilies are so called because individual blooms of the trusses only open and last in perfection for a day. They create beautiful colour masses in damp places in the water garden, or even under deciduous trees, and are best planted in November. Good sorts for the present purpose include—

Hemerocallis aurantiaca major.—This bears apricot-coloured flowers from June to August. Height, 4 ft.

H. citrina.—This bears pale yellow flowers from June to August. Height, 4 ft.

H. Dumortierii.—This bears orange flowers from May to July. Height, 2 ft.

H. flava.—This bears pure gold flowers from June to August. Height, 3 ft.

H. fulva.—This bears copper-bronze flowers from June to August. Height, 3 ft. Its variety, *variegata*, bears coppery-orange flowers, and has foliage margined cream.

Flags (*Iris.* Nat. Ord. Iridaceæ).—A small pool could be made sufficiently beautiful by being fringed with irises, reeds, and periwinkles alone; or some varieties of iris will look delightful rising out of St. John's Wort, against a background of foxgloves.

The true yellow WATER FLAG (*Iris Pseudacorus*) will thrive in a bog or grow right up from the bottom of a pond. In ordinary soil, however, the rhizomes should be planted about 2 ins. deep. To establish plants actually in water, obtain a clump, and plant preferably in a heap made up of equal parts of loam, leaf-mould, coarse sand, and old decayed manure, bringing this to within 6 ins. of the surface of the water. The best planting period for this, and indeed most irises, is November.

The JAPANESE IRIS (*Iris Kaempferi*) is best located on the verge of sun-reached water, some margin from which the roots can stretch out naturally to the wetter soil of the bed. It will grow successfully in 9 ins. of water, however.

The SIBERIAN FLAG (*Iris sibirica*) has fine green grass-like foliage, and makes an excellent display, as well as being quite hardy in moist ground. It should be planted not more than 2 ins. deep, and 6 ins. or more apart, in November.

We briefly describe some of the species most suitable for the present purpose below:—

Iris Kaempferi (JAPANESE IRIS).—This bears flowers of combined colours, in shades of blue, lavender, white, crimson, purple, grey, rose, and yellow, from July to August. Height, 2½ ft.

I. Pseudacorus (WATER FLAG).—This bears yellow flowers from June to July. Height, 3½ ft. Two good varieties of it are *alba* (cream), and *Bastardi* (lemon yellow).

I. sibirica (SIBERIAN FLAG).—This bears flowers in combined colours, and selfs of lavender, violet, blue, white, and yellow, from June onwards. Height, 3 ft. The sub-species, *orientalis*, and its varieties *Blue King* (blue) and *Snow Queen* (white), are better than the type.

Other Flags that will succeed in moist soil and are thus suitable for the drier portions of the water garden include—

Iris graminea.—This bears white and blue flowers in June. Height, 1½ ft.

I. Monnieri.—This bears gold and white flowers in August. Height, 4 ft.

I. ochroleuca.[1]—This bears yellow and white flowers in June. Height, 6 ft.

I. spuria.—This bears blue flowers in July. Height, 4 ft.

The MONSPUR HYBRIDS, bearing flowers in shades of blue, violet, lavender, etc., from July onwards, and growing about 4 ft. high, are also suitable.

Forget-me-not (*Myosotis.* Nat. Ord. Boraginaceæ).—*Myosotis palustris*, bearing blue flowers from May to August, and growing 1½ ft.

---

[1] *Iris orientalis* of Kew.—EDITOR.

in height, is a very useful water-garden plant.

Foxglove (*Digitalis*. Nat. Ord. Scrophulariaceæ).—This is able to bear floods in the water garden, or it may be planted where the river currents lave its lower leaves at times. The varieties of *Digitalis communis* (*D. purpurea* below) can be sown in seed-beds in April, and transplanted the same autumn. The following are useful for the water garden as well as for general borders :—

Digitalis lutea.—This bears yellow flowers in July. Height, 2 ft.

D. purpurea (Syn. *D. communis*).—This may be had in purple, mauve, rose, crimson, cream, or white forms. It blooms from May to August. Height, 2–5 ft.

Globe Flower (*Trollius*. Nat. Ord. Ranunculaceæ).—This is an exceptionally fine subject for the present purpose, and should be placed on terrace tiers, or little mounds of well-manured loamy soil, raised actually upon the boggy edges of the pool or river. As the earliest summer months find it in bloom, it is well to plant as early as possible in November. The following are useful for the present and for general purposes :—

Trollius acaulis.—This bears yellow flowers tinged with sepia, in June. Height, 6 ins.

T. asiaticus.—This bears deep golden flowers from May to June. Height, 1½ ft.

T. europaeus.—This bears golden flowers from April to June. Height, 1½ ft.

T. giganteus.—This bears lemon-yellow flowers from April to June. Height, 3 ft.

Goat's Beard (*Astilbe*. Nat. Ord. Saxifragaceæ).—This should be quite a feature of every water garden. It will bear cold climates or warm, but does best in semi-shade, and is most successfully planted in October. The leaves of all are highly ornamental. A few good sorts include—

Astilbe chinensis.—This bears rose flowers on crimson stems in July. Height, 4 ft.

A. Davidii.—This bears rose or red-purple flowers from July to August. Height, 5 ft.

A. grandis.—This bears white flowers from May to September. Height, 6 ft.

A. japonica.—This also is white, and flowers in July. Height, 2 ft.

A. rivularis.—This bears yellowish-white flowers from May to September. Height, 3½ ft.

Golden Rod (*Solidago*. Nat. Ord. Compositæ).—This is an extremely hardy subject and flourishes in the sun or the shade, bearing a wealth of feathery plumes which last for a long period on the plants. *S. gigantea* is notable as possessing handsome silky seed vessels that remain attractive during the winter months. These subjects should be planted in November or February in good soil near the water's edge. We recommend the following :—

Solidago altissima.—This bears yellow flowers from August to September. Height, 8 ft.

S. canadensis.—This bears yellow flowers in August. Height, 4 ft.

S. gigantea.—This also bears yellow flowers in August. Height, 6 ft.

S. procera variegata.—This bears yellow flowers from July to September. Height, 8 ft.

Grass of Parnassus (*Parnassia*. Nat. Ord. Saxifragaceæ).—This can be grown in boggy soil at the very edge of the water, and is best planted in March. Two suitable sorts are—

Parnassia fimbriata.—This bears white flowers in July and August. Height, 9 ins.

P. palustris.—This bears white flowers from June to August. Height, 6–9 ins.

Groundsel (*Senecio.* Nat. Ord. Compositæ).—The following are very hardy if planted in sunshine-reached bogs, and are meritorious by reason of the late season at which they continue to yield their showy blossom spikes :—

Senecio Clivorum.—This bears yellow flowers from July to October. Height, 5 ft.

S. pulcher.—This bears rosy-carmine flowers from July to December. Height, 3 ft.

Knot Grass (*Polygonum.* Nat. Ord. Polygonaceæ).—There are over 150 species of Polygonum, of small, medium, tall, or towering growth. Many thrive in ground sometimes inundated, or usually wet, and are best planted in March or October. As, however, there are many better subjects, we only describe one species, namely—

Polygonum sachalinense.—This bears greenish-white flowers from July to September. Height, 12 ft.

Lily (*Lilium.* Nat. Ord. Liliaceæ).—Lilies cannot be omitted from any water garden, however small, as they have a special charm near the water. A tall trio will give dignity to the head of a small pond, while the loveliness of thickets of dwarfer species is unsurpassable, whatever the position may be in which they are planted.

The following species should have a damp, but not water-logged soil in a semi-shady site. *Lilium chalcedonicum* and *L. monadelphum* should be planted in November, 5 ins. deep and 4 ins. apart each way, after which a heap of cinders should be put over them for the winter. The AMERICAN SWAMP LILY (*Lilium superbum*) should be planted 6 ins. deep, and 1 ft. apart each way. The GIANT HIMALAYAN LILY (*Lilium giganteum*), which has immense, heart-shaped leaves, as well as delightfully scented flowers, must be planted 6 ins. deep also, and 15 ins. apart each way. It should be set in a site which is always wet, and one in shade. We briefly describe the best lilies for the present purpose below :—

Lilium chalcedonicum.—This bears scarlet flowers in July and August. Height, 3 ft.

L. giganteum (GIANT HIMALAYAN LILY).—This bears white flowers tinged with purple, in August. Height, 10–12 ft.

L. Martagon (MARTAGON LILY, or TURK'S CAP LILY).—This bears purple and black flowers in July. Its variety *album* is white. Height, 2½–3 ft.

L. monadelphum.—This bears lemon-yellow flowers in July. Height, 3–5 ft.

L. pardalinum (PANTHER LILY).—This bears orange-scarlet flowers spotted with purple, in July. Height, 5–8 ft.

L. superbum (AMERICAN SWAMP LILY).—This bears orange-red flowers spotted brown, in July. Height, 5–10 ft.

Loosestrife (*Lythrum.* Nat. Ord. Lythraceæ).—This is a family of giant plants that can be set as specimens in bogland, or at the water's edge, to blossom all through the late summer and autumn. They are best planted in November. The following are the best :—

Lythrum Salicaria.—This, and its variety *superbum,* bear deep rose and red-purple flowers from July to September. Height, 5–6 ft.

Marsh Marigold (*Caltha palustris.* Nat. Ord. Ranunculaceæ).—Water may flow over this plant's roots, or merely permeate the surrounding soil, but in either case it will grow well. The best planting period is October, and it may be remarked that the varieties *flore pleno* (double gold) and *purpurascens* (orange flushed with maroon) are better than the type. All bloom from June to July, and average 1–1½ ft. in height.

Meadow Sweet (*Spiraea.* Nat. Ord. Rosaceæ).—Practically every kind of Meadow Sweet will thrive in moist borders in or out of the water garden if planted in October or November, so that it is impossible to name all the valuable sorts here. The following half-dozen should, however, be grown before all others:—

Spiraea Aruncus.—This bears white flowers in June. Height, 5 ft.

S. astilboides.—This bears cream-coloured flowers in July. Height, 5 ft.

S. gigantea.[1]—This bears white flowers in July. Height, 10 ft.

S. japonica.[2]—This bears rose-coloured flowers in July. Height, 4 ft.

S. Lindleyana.—This bears white flowers in August. Height, 10 ft.

S. palmata.—This bears rosy-crimson flowers in July. Height, 4 ft.

Monkey Flower (*Mimulus.* Nat. Ord. Scrophulariaceæ).—This is an admirable little plant for clothing moist banks, or making carpets near the water, and only requires to be planted in good rich soil in March. The four best species are briefly described below:—

Mimulus cardinalis.—This has scarlet-crimson flowers from June to August. Height, 2 ft.

M. cupreus.[3]—This bears orange flowers from June to August. Height, 1 ft.

M. luteus.—This bears scarlet-crimson flowers from May to August. Height, 1 ft.

M. radicans.—This bears white flowers from May to July. Height, 6–12 ins.

Orchid (*Orchis.* Nat. Ord. Orchidaceæ).—All the members of this family are fascinating gems for boggy places where the soil is lightened by peat or decayed leaves, only requiring to be planted in March. The three best species are—

Orchis foliosa.—This bears purple-crimson flowers in May. Height, 2 ft.

O. latifolia.—This bears purple flowers in June. Height, 1½ ft.

O. maculata superba.—This bears purple flowers in June. Height, 2 ft.

Periwinkle (*Vinca.* Nat. Ord. Apocynaceæ).—This is a family of trailers almost indispensable for water gardens, to cover margins, but seen at their best, perhaps, when overhanging banks or low walls so as to touch the stream or pool. Plant in March or October. There are plain green-leaved or variegated forms of the following available:—

Vinca major.—This bears purplish-blue flowers from June to August. Height, 2 ft.

V. minor.—This bears blue flowers, and its variety *alba* bears white flowers, from June to August. Height, 1 ft.

Phlox (*Phlox.* Nat. Ord. Polemoniaceæ).—Both the summer and autumn blooming herbaceous Phloxes are such moisture-loving subjects that they will live and do well in soil that is nearly always wet. Their vivid colours make them specially valuable for bold effects by lakes and ponds. All they require is to be firmly planted in November or March. We recommend the following:—

---

[1] *Spiraea camtschatica* of Kew.—EDITOR.

[2] *Astilbe japonica* of Kew.—EDITOR.

[3] *Mimulus luteus cupreus* of Kew.—EDITOR.

Phlox decussata.[1]—This may be had in red, pink, crimson, salmon, vermilion, organe, purple, lavender, mauve, cream, grey, maroon, or pure white forms, and blooms from July to October. Height, 2–5 ft.

P. suffruticosa.—The colours and period of blooming are the same as the above. Height, 1–3 ft.

Primrose (*Primula.* Nat. Ord. Primulaceæ).—The WOODLAND PRIMROSE (*Primula vulgaris*) should dot the mossy banks of streams and lakes. The handsome JAPANESE PRIMROSE (*Primula japonica*) revels in moist shady situations. Plant the former in October, and the latter in March. There are countless species of great beauty, such as *Primula Beesiana, P. Parryi,* and *P. sikkimensis,* though these are of somewhat difficult culture, many of them requiring a peaty soil. The two best for the present purpose are—

Primula japonica.—This may be had in crimson, pink, or blush-white forms, and blooms in May. Height, 1½ ft.

P. vulgaris.—This bears flowers of typical Primrose yellow in April. Height, 9 ins.

Reedmace (*Typha.* Nat. Ord. Typhaceæ).—All watersides need masses of foliage plants, and the present plant affords a welcome relief to gay flowers. The leaves are flat and very long, and from these rise the velvety heads of purplish florescence that turn black with age. The best planting period is October, and it is well to note that the heads may be improved in size if the plants are fed from time to time with weak manure water. The best species is—

Typha latifolia.—This bears greenish-purple flowers which change to black, from July onwards. Height, 5–7 ft.

Rhubarb (*Rheum.* Nat. Ord. Polygonaceæ).—This is a family of handsome giant plants suitable for planting near large lakes, or by the sides of very large ponds. They are valuable for their foliage, and are best planted in March. The two best species for the present purpose are—

Rheum collinianum.—This bears crimson flowers in July. Height, 3 ft.

R. officinale.—This bears yellowish-white flowers in July. Height, 10 ft.

Rockfoil (*Saxifraga.* Nat. Ord. Saxifragaceæ).—This is suitable for planting in moist soil, but not within actual reach of the water, and the best time to set it is November. We recommend the following species :—

Saxifraga cordifolia.—This bears rose flowers in March. Height, 1½ ft.

S. peltata.—This bears pale pink or white flowers in May. Height, 2 ft.

S. umbrosa (LONDON PRIDE).—This, as is well known, bears pinkish-white flowers from May to July. Height, 1–1½ ft.

Royal Fern (*Osmunda regalis.* Nat. Ord. Filices).—This bears the greenest of all green waterside foliage. It is a lovely fern requiring a semi-shady site, and is best planted in October. Height about 2½ ft.

St. John's Wort (*Hypericum.* Nat. Ord. Hypericaceæ).—This is a well-known foliage plant which clothes the ground with glossy foliage all the winter, and supplies good floral effects all the summer. It may be successfully planted from October to March. The best water garden sorts are—

Hypericum calycinum.—This bears

---

[1] *Phlox paniculata* of Kew.—EDITOR.

yellow flowers from May to August. Height, 2 ft.

H. japonicum.—This bears yellow flowers in May and June. Height, 1½ ft.

Solomon's Seal (*Polygonatum.* Nat. Ord. Liliaceæ).—This is so graceful when fully grown, and so attractive is its fresh green foliage when shooting up in the spring, that all watersides should have an abundance of it. It is of very easy culture, and only requires to be planted in its permanent position in November. The best species is—

Polygonatum multiflorum.—This, known also by the name of DAVID'S HARP, bears white flowers in May and June. Height, 3 ft.

Sweet Flag (*Acorus.* Nat. Ord. Araceæ).—This is a graceful plant which will thrive in bog or water in cold or genial localities, and is best planted in March. The best sorts are—

Acorus Calamus (MYRTLE GRASS).—This bears greenish-yellow flowers in July. Height, 4 ft.

A. Calamus striatus aureum.—This has greenish-yellow flowers and bold variegated foliage. It blooms in July. Height, 2½ ft.

Violet (*Viola.* Nat. Ord. Violaceæ).—This can be used for studding banks and gentle slopes near the water; but though the roots like moist soil, they cannot live in ground that becomes flooded, and in wet districts are best planted in April, otherwise September is a good time for the work. The best sorts for the present purpose are—

Viola odorata (SWEET VIOLET).—This bears violet, red purple, blue, or white flowers from March to May, and often again in the autumn. Height, 3–6 ins.

V. suavis alba.—This bears white flowers in June. Height, 4 ins.

Water Lily (*Nymphaea.* Nat. Ord. Nymphaeaceæ). — See our special article on *WATER LILIES.*

Willow Herb (*Epilobium.* Nat. Ord. Onagraceæ).—This is a family of useful plants for making thickets close to the water. The best planting periods are November or March. We recommend the following species :—

Epilobium album. — This bears white flowers in July and August. Height, 5 ft.

E. angustifolium (ROSE BAY).—This bears rosy-crimson flowers in July. Height, 4–6 ft.

Winter Heliotrope (*Tussilago fragrans.*[1] Nat. Ord. Compositæ).—Although this subject only bears insignificant lilac-white blossoms in January and February, these are deliciously scented, while the carpet its glossy green leaves make is of the utmost value. The best planting period is March, in order that the plant may become well established before the winter comes on. Its height averages only 9 ins.

M. H.

WATER GLASS.—See POTASSIUM SILICATE in *POTASH AND POTASSIUM COMPOUNDS*, and SODIUM SILICATE in *SODA AND SODIUM COMPOUNDS.*

WATER HEMLOCK (*Cicuta virosa.* Nat. Ord. Umbelliferæ).—This is a hardy herbaceous moisture-loving perennial suitable for the wild or water garden. It bears white flowers in July, and averages 2–4 ft. in height. A dangerous plant with the same English name, but botanically known as *Œnanthe crocata* (Syn. *Œ. apiifolia*), is referred to in our article on *ŒNANTHE.* The two are not synonymous.

WATER HEMLOCK (*Œnanthe crocata*).—See *ŒNANTHE.*

WATER HICKORY (*Carya aquatica*).—See *TREES.*

---

[1] *Petasites fragrans* of Kew. See article on *PETASITES.*—EDITOR.

WATER-LEAF. — See *HYDROPHYLLUM.*

WATER LILIES (*Nymphaea.* Nat. Ord. Nymphacaceæ).—Of all the phases of modern gardening none is more charming and attractive than water gardening; and of all the plants used in this connection none is more beautiful and important than the Water Lily.

Many species of Nymphaca inhabit the fresh waters of Europe, Asia, Africa, and Australia, but few are suitable for cultivation out of doors in our own land, except the COMMON WHITE WATER LILY (*Nymphaea alba*) of our lakes and ponds, and its rose-coloured variety (*Nymphaea alba rubra*), often called the SWEDISH WATER LILY. Other species sometimes grown are *N. odorata,* and the variety *rosea,* which, crossed with *N. alba,* probably gave origin to the magnificent coloured hybrids raised by the late M. Latour Marliac in France, and by other raisers in America, and which have completely revolutionised water gardening. *N. pygmaea,* and its variety *helvola,* are tiny kinds suitable for very shallow water by the margins of sunny ponds or fountain basins. *N. tuberosa* is a strong-growing American species suitable for fairly deep water. At the present time, however, the hybrids or seedlings of various beautiful colours are the most important, and a list of them will be given below.

Culture.—This is not difficult given the essentials of a sunny sheltered position, water varying from 1 ft. to 3 ft. deep, and abundance of rich mud in the bottom. Many of the stronger growers will flourish in much deeper water, but the point of interest to most people is the fact that very deep water is not necessary. In cold districts where prolonged hard frost is common and the water is likely to be frozen to a considerable depth, it would be advisable only to attempt the strongest growers which are able to rise to the surface of deep water, but whose rhizomes would be safe from frost in the mud below.

It is not within the province of this article to discuss the construction of artificial ponds and lakes, as this matter is dealt with in our article on *WATER GARDEN, THE,* but if their ultimate object is to form a home for Water Lilies the above essentials must be provided. It is not advisable to utilise swiftly running water, but there should be sufficient movement to prevent stagnation.

Most of the hardy Water Lilies grow by means of rhizomes which spread about among the mud, emitting long fleshy roots. As received for planting they usually consist of a short piece of rhizome with a growing point. The best method is to plant this in an open wicker-basket, using good loam mixed with a little rotten cow manure; sufficient room being left on the top of the basket for a couple of fairly heavy stones to keep it from floating when placed in the water. If the rhizomes should be very small and weak it is better to grow them on in small tubs for a time until strong enough to put out in the pond or lake. The water in the tubs should be kept sweet and clean by adding a few gallons every two or three days.

In subsequent years Water Lilies give little trouble. The strongest growers will in time become a mass of "Crowns," with the result that many of the leaves in the centre of the mass will be pushed above the water and the flowers consequently hidden; also fewer flowers are produced when this condition arises, The remedy is to thin out the crowns, an operation obviously only possible in comparatively shallow water. The best time to work is just when growth is commencing in the spring and the young leaves can be seen rising to the surface. A sharp blade is a suitable tool with which to cut through the rhizome at some convenient place behind the growing point. When the water becomes muddy a little practice will enable the operator to find the crowded rhizomes by feeling about with the spade. A strong rake or drag is usually necessary to wrench the separated portion out of the mud.

Water Lilies are not often subject to insect pests or fungoid diseases, but occasionally during a hot, dry summer Aphis attacks the leaves. This may be disposed of by spraying once or twice with a weak insecticide. Sometimes a fungoid disease attacks the young leaves, causing them to become discoloured and to decay before full development,—the only remedy is to cut them off as near the base as possible, an operation which cannot be done except in fairly shallow water. Happily such attacks are uncommon and need deter no one from enjoying the most beautiful of all aquatic plants.

What to Grow.—The following species and varieties can be cordially recommended, though new ones are being constantly introduced; and it should be noticed that the figures in brackets do not signify the height of the plants but the depth of water in which they are best planted:—

Nymphaea alba (Common White Water Lily).—White flowers from June to August (*D.* 3 ft.). Its variety *rubra*, the Swedish Water Lily, is red.

N. Arc-en-ciel.—Pink flowers from June onwards (*D.* 1½–2 ft.).

N. atropurpurea.—Deep crimson purple flowers from June to September (*D.* 3 ft.).

N. Aurora.—Rose and yellow flowers, changing to salmon from June onwards (*D.* 1½–2 ft.).

N. Brackleyi rosea.—Pale rose flowers from June to September or later (*D.* 1½–2 ft.).

N. chrysantha.—Yellow flowers, deepening to orange-red from June onwards (*D.* 3 ft.).

N. Colossea.—Soft pink flowers in May and throughout the summer (*D.* 3 ft.).

N. Ellisiana.—Deep rose-red flowers from June to September (*D.* 1½–2 ft.).

N. Escarboucle. — Vermilion-red flowers in June and subsequent months (*D.* 3 ft.).

N. Froebelli.—Large deep crimson flowers from June onwards (*D.* 1½–2 ft.).

N. fulva.—Yellow flowers flushed pink, changing to orange-red from June onwards (*D.* 1½–2 ft.).

N. Gladstoniana.—Large white flowers from end of May onwards (*D.* 3 ft.).

N. Gloriosa.—Carmine flowers in summer and autumn (*D.* 1½–2 ft.).

N. James Brydon. — Rosy-red flowers in June and throughout the summer (*D.* 1–2 ft.).

N. Laydekeri.—The varieties *fulgens* (deep red), *purpurata* (deep crimson), and *rosea* (soft pink, deepening to carmine) are the best, and bloom from June onwards (*D.* 6–12 ins.).

N. marliacea.—The varieties *albida* (white), *carnea* (flesh), *chromatella* (yellow), *flammea* (crimson-purple), and *ignea* (rich crimson) are the best, and bloom from June onwards (*D.* 3 ft.).

N. odorata.—White flowers in summer (*D.* 1½–2 ft.). Its variety *rosea* has rose-pink flowers.

N. Richardsoni.—White flowers in June and onwards (*D.* 3 ft.).

N. sulphurea.—Yellow flowers in June and July (*D.* 1½–2 ft.).

N. tetragona. — White flowers June to August (*D.* 6–12 ins.). Its variety *helvola* has yellow flowers.

N. tuberosa.—Large white flowers from June to September (*D.* 3 ft.).

N. William Doogue.—Soft pink flowers from June onwards (*D.* 1½–2 ft.).

N. William Falconer.—Ruby-crimson flowers in June and throughout the summer (*D.* 1½–2 ft.).

J. W. B.

WATER LOCUST.—A name applied to the genus GLEDITSCHIA, more especially *G. aquatica.* See *TREES.*

WATER MEASURES.—See *WEIGHTS AND MEASURES.*

WATER OAK (*Quercus nigra*).— See *TREES.*

WATER THYME (*Elodea canadensis.* Nat. Ord. Hydrocharidaceæ). — This plant is by some people highly prized as an aquatic. It may be grown in the same way as *WATER LILIES*, on which we give a separate article.

WATER : TO SOFTEN.

Soft water is much better than hard for watering plants, and is much pleasanter to wash soiled hands in after working in the garden. There are two classes of hardness which may be treated as follows :—

Permanent Hardness.—This as a rule contains sulphates of lime and magnesia, and is regarded as difficult to soften. This is not the case. A strong solution of washing soda should be made with rain water, and this poured into a tub of the hard water a little at a time. A certain milkiness will result, and the whitish material should be allowed to settle. The process is then repeated, and repeated until no more white matter settles out, and when it has been filtered it will be found to be perfectly soft.

Temporary Hardness.—This is the most common form of hardness, and the water contains bicarbonate of lime in some quantity. Strong lime water will soften it, and this should be added in the same way as the above until no white matter settles out, when it will be found that the water is soft.

It should be mentioned that water softened in these amateur ways should not be used for drinking purposes.

WATERER'S GOLD WEEPING HOLLY (*Ilex Aquifolium aurea pendula*).—See *HOLLY.*

WATERING.

Watering is the artificial application of moisture to soil for the benefit of plants growing therein. Domestic plants, especially when grown in pots or under glass, are wholly dependent on the cultivator for their water supply, and the seeing to this branch of work occupies a large portion of the gardener's time. Rain water is the best to use, especially for pot plants, being "soft," that is, it contains no lime, and is warmer than spring or well water. River and pond water come next, while that from wells and springs, including tap-water in town areas, is the worst. It is often "hard"—contains much lime—and is distinctly cold. Such water should stand in tubs or open vessels for at least twenty-four hours to become aerated and raised to the level of the general temperature. The use of water much colder than the soil plants are growing in tends to give a check to the roots, resulting in crippled growth and yellow foliage. Too cold water can always be readily warmed by the addition of hot from the kitchen kettle or boiler.

The golden rule in watering crops and plants of all kinds, whether in pots or not, and whether growing indoors or out, is thoroughly to moisten all the soil occupied by the roots. The quantity used is quite immaterial. A tablespoonful may be sufficient for a small pot plant; a couple of gallons may be required by a subject growing in a tub. The principle remains the same. Watering by driblets at stated intervals is bad gardening; with pot plants it leaves the mass of soil unwetted; with outdoor crops it encourages surface rooting and leaves them peculiarly susceptible to injury from drought. Well-moistened soil acts as a reservoir in dry weather, and if surface evaporation is checked by the use of the hoe or by a mulch of manure, lawn mowings, etc., quite a long drought can be passed in comparative safety. Should the water supply be too little for well watering the whole of a given crop, then do a portion thoroughly, rather than give a little to the whole.

Soil irrigation is useful in the case of fruit trees, shrubs, etc., where the surface is hard or sloping and flooding cannot be adopted. Driving a crowbar into the soil for a depth of 2 ft. or 2 ft. 6 ins. at 3 ft. intervals and then filling the holes with water is a good method. Climbers and fruit trees against walls, also window boxes, often need watering in rainy weather owing to the direction of the rain being such that they receive none.

Outdoor seed-beds should be heavily watered over-night, the seeds being sown the next day; this is much better than trying to water after sowing and generally lasts long enough for germination to take place. Seed pots and pans are best watered by submerging them to the soil-level in a vessel of water, and holding thus till the water percolates upwards through the drainage hole.

Plants growing in pots and hanging baskets, whether indoors or out, need constant attention, especially in warm weather. Once thoroughy dry, irreparable damage is often the result, and in any case the plants suffer. Bud dropping at a later stage is often traceable to such neglect or oversight. Watering in greenhouses is commonly done in the early morning, but in hot summer weather it is necessary to go through the collection again in the late afternoon, and water all that are becoming dry. Plants in a root-bound condition will need two or three times as much water as similar subjects not so well rooted. In dry weather it is allowable to stand very thirsty subjects in saucers and keep these filled with water.

In summer it is not usual to over-water plants, but at other seasons, and especially in low temperatures, this may accidentally be done. The preventive is to test before applying. This is done by rapping the pot with the knuckles or with a padded stick. If a dull heavy sound follows no water is required; if a sharp ring is given off then apply the watering-pot. Do not water by rule of thumb; in winter especially give no water at all unless really needed. Few plants should be dried off entirely, and these are confined to bulbs and tubers. Other deciduous subjects, such as fuchsias and ferns, should have the soil prevented from becoming dust dry. Cacti and other fleshy plants are best not watered during the winter unless shrivelling is apparent.

Plants that accidentally become thoroughly dry are best revived by immersing in a tub for twenty minutes. Hanging baskets are best watered by this method to ensure thorough saturation.

Overhead watering of plants either

by a rosed watering-pot or a syringe is very beneficial in greenhouses during late spring and early summer, imitating the April shower and encouraging a similar growing condition of the atmosphere. Five to 6 p.m. is a suitable hour, closing or partially closing the house at the same time for two or three hours. Tropical plants and orchids need copious waterings and syringings during the growing season, those with aerial roots largely depending on atmospheric moisture for their supply.

The instrument commonly used for watering plants is known as a watering-pot, and is usually fitted with a broad perforated detachable end known as a "rose," which breaks the water up into a spray. There are many varieties and sizes of watering-pots suited to varying requirements, but for indoor work a light size with a shallow body and long spout serves well; for outdoor use a larger one with a short spout is advisable. In applying water, whether to pot plants or garden ground, always hold the spout low and pour over the soil, otherwise the surface may be much disturbed and soil washed away. With pot plants do not pour into the plant's centre but on the surrounding soil. In the case of newly potted plants the rose should be used till the soil has become settled.—H. A. S.

WATERING AFTER PLANTING.—See *BEDDING OUT.*

WATERING CACTI.—See *CACTI.*

WATERING CANS.—See WATERING POTS in *GARDEN APPLIANCES.*

WATERING FERNS.—See *FERNS AND FERN GARDENING.*

WATERING MORAINES.—See *MORAINE GARDENING.*

WATERING ORCHIDS.—See *ORCHIDS: POTTING AND WATERING OF.*

WATERING POTS.—See *GARDEN APPLIANCES.*

WATERING VEGETABLES.—See under GENERAL MANAGEMENT in *VEGETABLES: GENERAL CONSIDERATIONS.*

WATERPROOFING.

Garden work often entails a certain amount of getting about in wet weather. Now and again it is useful to waterproof the old garments that are worn in the open. A useful way of doing this is briefly described below. Make a weak solution of size or glue and water. This should set similarly to a badly made jelly when it is cold. Whilst the mixture is hot throw in a lump of alum, allowing half an ounce of this to every pint of the solution. Then add a breakfastcupful of soapsuds to the same quantity of hot solution, and brush it over the garments whilst still hot. It will be found to render them completely waterproof, and the addition of soap prevents the glue from hardening the material. Any kind of cloth can be rendered waterproof by rubbing the underside with a lump of beeswax. A sufficient amount of the wax should be applied to the cloth to give it a slightly greyish appearance.

Making Boots Watertight.—Dry feet are of supreme importance to the gardener, and on this account it is desirable to render boots waterproof. The liberal application of almost any kind of grease will of course keep out the damp. But in time, however, this treatment will rot the leather, and the boots will get into a very unsatisfactory state. A well-tried preparation is made as follows: Mix together ½ pint of linseed oil, 4 oz. of mutton fat, 3 oz. of clean beeswax, and 2 oz. of resin. These ingredients should be mixed in a pot over a slow fire, and the preparation applied when the boots are clean and dry. It is brushed on whilst warm, but it must not be put on very hot or it will shrink the leather. One application is sufficient to make the boots absolutely water-tight for a considerable period, during which the leather remains in a pliant state. Boots that have been waterproofed should never be placed near to a fire when they are damp. By far the best plan is to wipe away the external moisture with a dry cloth and then stand them in a cool place.—S. L. B.

WATSONIA (Nat. Ord. Iridaceæ). This is a very beautiful free flowering bulbous plant for pot culture in a cool greenhouse, and is increased by offsets. It should be potted in good loamy soil, leaf-mould, and sand. Temperature needed, 40–50° F.

Greenhouse Species :—*Watsonia angustifolia*.—Delicate pink. Flowers in June. Height, 1–1½ ft.

W. densiflora.—Rose. Flowers in May. Height, 1–1½ ft.

W. iridifolia Ardernei.—Large pure white flowers borne on elegant spikes. Specially recommended for cutting, as the cut flowers will remain in good condition for a fortnight. Flowers in June. Height, 2–2½ ft. high.

W. Meriana.—Bright rose. Flowers in May. Height, 1½–2 ft.

W. plantaginea.—Pink. Flowers in June. Height, 1–1½ ft.

WAUKEGAN JUNIPER (*Juniperus Sabina procumbens*).—See *Trees*.

WAX GOURD.—See *Ornamental Gourds*.

WAYFARING TREE (*Viburnum Lantana*).—See *Shrubs*.

WEATHER AND GARDENING.

There is a certain class that pours out scorn on the type of man known as "the fair-weather gardener." Up to a point the scorn is applaudable, but after that it is ridiculous. While we may admire men who work on the land in all weathers to some extent, we have to admit that it is really very little use working out of doors in awful weather.

Take, for instance, two examples of gardening work—digging, and sowing seeds.

The fair-weather gardener says that he will not dig frost and snow into the ground. The all-weather gardener does not hesitate to do so, however; he says that his garden must be dug somehow or other by a certain date. So he digs the frost and snow in.

He is wrong, however, and the fair-weather gardener is right. Snow and frost if dug into the land are both exceedingly harmful, and it would be far better to leave the land alone on such days, or to do some necessary work such as stacking manure, or wheeling it on to the ground when the land is hard. It is a different matter to dig during rain. That is only unpleasant. The fair-weather gardener is wrong to leave his land alone then, if the season is getting late, for it shows he is afraid of a wetting; he probably thinks he will melt like a lump of sugar or a piece of salt. But he will not. Again, immediately after a very heavy thaw the land is best left alone, since to dig in mud is almost as bad as to dig in frost.

In the question of seed sowing much the same holds good. The all-weather gardener first of all proceeds to construct for himself a time-table of work, based on facts given him by some other equally old-fashioned all-weather gardeners. This time-table fixes dates for sowing every kind of seed. The all-weather gardener puts the time-table up in his potting shed and keeps rigidly to it. To him it does not matter what sort of state his soil is in, provided it is not frozen too hard to cut with his hoe; he must get his seeds in by those certain fixed dates. I have known men to rake off snow to sow parsnips, and to plant peas and broad beans in a soil little else than a puddle. They expect good crops, and they sometimes even get them, more by fluke than by anything else.

The fair-weather gardener is again more sensible. He looks at his soil, he tests it in the usual way by clenching and releasing it in his hand, and when it binds into a ball of mud he rightly concludes that it is not the least use sowing seeds. If he is energetic he takes steps to dry the surface of his soil by frequent deep hoeing, and if not he waits for the weather to mend. Even though he sows a little late he has a much better chance of getting a really good crop than has his brother the all-weather man—a point worth remembering.

From the above it will be seen that the all-weather man should be more chary about scorning his fair-weather brother than he is. There is a time for doing all things connected with gardening, as the Calendars in this book amply show. But if successful results are ultimately to be attained, the weather conditions at the start must be of a suitable nature for carrying out the work. I could go on to speak of the folly of doing any form of planting in bad weather, but the foregoing will be sufficient to make gardeners study the weather when working.—E.

WEED KILLERS.

These are essential if there is much in the way of pleasure grounds under the gardener's care. Various proprietary articles are on the market, useful though expensive, and thus some gardeners prefer to make their own. This is easily done as follows:—

Carbolic Acid.—A 1% solution of the pure acid (*i.e.* 1 part acid to 99 parts of water bulk for bulk) makes quite an effective weed killer, but the pure acid being difficult to obtain in some places the common commercial acid can be substituted and 1 lb. of this mixed with every 14–15 gallons of cold water. Care must be taken that the acid does not float on the surface but is evenly mixed with the whole, and on no account must any come in contact with the clothes or flesh, as it is very corrosive. The liquid is applied through the fine rose of a watering-can to weedy gravel paths, etc., and a good soaking given.

Caustic Soda.—A solution of this made by dissolving 1 lb. in 10 gallons of water is recommended by some as a weed killer, but is still rather in the experimental stage. Its use should be limited to very hot weather on gravel paths, and a good soaking given as before.

Copper Sulphate.—Copper sulphate, or BLUE STONE, has an undoubtedly corrosive effect on green leafage, as is evidenced by scorching if potato-spraying liquids are improperly mixed. This may be turned to advantage as a weed killer in districts where this material is cheap. The use is still in the experimental stage, but a solution of 1 lb. per 5–10 gallons of water may be used with some success in hot weather.

Salt.—This is of undoubted value as a mild weed killer. It is best applied dry and scattered freely over weedy paths on the first really hot day in the early summer. The weeds will wither in a few hours, and can then be got up without much difficulty. HOT BRINE, made by dissolving as much salt as is possible in each gallon of boiling water, is also a splendidly effective weed killer if a thorough soaking of the boiling liquid is applied to young weeds on paths through a fine-rosed can.

Sodium Hydrogen Sulphate.—This also is of great value as a weed killer. A strong, almost saturated solution should be made as the material is cheap, and this applied hot through a fine-rosed can.

Vitriol.—A 4% solution of oil of vitriol (Sulphuric Acid) in water makes a weed killer of enormous value—it is probably the most useful of all. The acid must not be measured in a metal utensil, but in one of pot or well-glazed earthenware to prevent damage. The water should be measured into a wooden tub and the acid poured very slowly into it with constant stirring. If the water-can is used this must be repainted all over before and after use on account of the corrosive action of the acid. This solution may be used at any time, a thorough soaking being given as before.

Besides these materials there are one or two mixtures which make good weed killers. Many gardeners swear by a mixture of equal parts quicklime and salt applied in dry weather, but this is objectionable in wet districts. A good solution for watering paths may be made by boiling about 1 lb. of White Arsenic and the same weight of Caustic Soda together in 4–5 gallons of water until a clear solution results. Then filter and bottle the liquid, using a pint of this stock solution per gallon of water.

Warnings on Weed Killers.—If any of these liquids remain over after use it should be bottled and labelled "Poisonous" to prevent accidents. These bottles should not be left about, but are best locked up in the tool shed.

The clothes and hands must not come in contact with the majority of the liquids, or bad burns will result.

The liquids must be kept away from live edgings, grass verges, dwarf hedges, etc., or the latter will be greatly damaged, if not destroyed.—E.

WEEDING.

From the beginning of April to the end of October the gardener should never cease weeding, since, if he does, his land and crops will be robbed right and left of food and water. Many gardeners err by reason of the fact that they start weeding too late in the season. They let the ground assume a verdant meadow-like appearance and then, late in May, instead of early in April, they start attacking the weeds. They are too late. Already the soil has been robbed of food and moisture, already the crops have suffered for lack of air and light, and the prospects of the best results have vanished into space. Had weeding been done earlier, in fact as soon as the rows of crops were sufficiently above the ground to show their presence, much less labour would have been needed, and the ultimate results would have been better in every way.

The writer well remembers some weeding experiences, a record of which is published elsewhere. He thinks that gardeners on the whole are a very lazy lot as regards weeding. It is so easy when one sees a few weeds between the lines of our crops to say: "These are not worth troubling about." But soon these few neglected weeds seed, and breed hundreds more. It is surely a case of being in time.

There are many modes of weeding. And here opinions differ. The present writer is fully convinced of the enormous value of the Dutch hoe as a weeding tool, except in certain cases. There are weeds such as trefoil, wild strawberry, ground ivy, and twitch which no sensible gardener should attempt to raise with a Dutch hoe or any other hoe. Such weeds should be got up with a weeding fork, and broken as little as possible, since every little piece broken off seems capable of growing. The use of the hoe for such weeds serves to break them up into many pieces—just the opposite of what should be done. Then again the Dutch hoe is very little use in the case of long-rooted weeds such as dandelions. It only cuts their crowns off; then they immediately form a callus and three or four more crowns. A digging fork is the right tool to use for raising dandelions and similar deep rooting weeds.

But for surface rooting weeds, not in seed, such as charlock, groundsel, chickweed, feverfew, etc., the Dutch hoe is a splendid tool to use. A few sharp reaches or cuts with this removes the top growth of the weeds, and a deeper cut (which should in every case immediately follow the surface one) throws out most of their roots.

Weeds should not be left lying on the surface soil except on hot dry land, and even then it is a risk. The gardener should remember what terribly strong constitutions weeds have and treat the subject of weeding with the respect due to it. If the weeds are left lying about on cold damp soils even in the strongest sunshine, they may suddenly shoot into growth again. On hot dry soils the weeds soon wither when hoed up, but the first shower of rain frequently makes them start growing again. Flowers are prematurely formed and seeds ripened, so unless the gardener gets rid of weeds in some satisfactory manner immediately after hoeing them up, he is likely not to have to do his work merely over again, but ten times over again. No saying is truer than that which tells us that "one year's seeding means ten years' weeding."

Hand weeding demands a little consideration. There are some portions of the garden where the hoe cannot be used and where the weeder would be tiresome. In such cases rather than let the weeds get a hold and spoil the effect, as well as spoil the plants, the weeding should be done by hand. In very dry weather this is almost impossible if the work is to be done thoroughly, owing to the grip the weeds have on the soil. The best time, and the safest as regards the growing plants, is to do the work immediately after, or during a heavy shower. The weeds are firmly gripped towards their base with the right hand, and a slight but sudden twist brings them out root and all. Care must be taken not to leave the roots of the weeds in the ground, otherwise there will be more trouble in the course of a week or two.

Our aim should be not to let the weeds ever grow to any size. To keep the ground clear, there is no better practice than to hoe the borders and vegetable garden regularly at least once, or, better still, twice each week. Weeds cannot grow in the loose friable layer of soil obtained by frequent hoeing, and advantage of this fact should be taken.

There is only one safe way of destroying deep rooted and creeping weeds, also weeds which are in seed. That is by burning them. The method of working is dealt with in a separate article, to which article (*Burning Garden Rubbish*) the reader is referred.

Soft weeds which are not in flower may also be burnt, but it is wasteful. The best method of disposing of these is dealt with in the article on *Vegetable Matter*, to which the reader is asked to refer.

E. T. E.

See also *Orchards: Making and Management of; Trees: Raising from Seed; Vegetables: General Considerations.*

WEEDS.

The kinds of weeds with which a gardener has to contend are determined by various factors, such as locality, soil, climate, and cultivation. The number of species that may occur as garden weeds is very large, but comparatively few are so generally found as to need special consideration. The most important of these are as follows:—

Annual Meadow Grass (*Poa annua*. Nat. Ord. Gramineæ).—Annual. Occurs in tufts. Leaves bright green, usually somewhat wrinkled in places. Found in all sorts of situations, though the individual plants are often very short lived. Flowers all the year round. Height, 2–6 ins.

Means of Control.—Constant hoeing, to prevent seeding.

On Paths.—The weeds should be hoed or cut down, and the paths then dressed with one of the following weed killers:—

(1) Common salt, applied dry, sufficient to whiten the surface.

(2) Washing soda, applied in a solution containing 5 lb. in 10 gals. of water.

(3) Bluestone (copper sulphate), 5–10 parts to 100 parts of water.

(4) Carbolic acid, 1 part to 100 parts of water.

(5) Sulphuric acid, 4 parts to 100 parts of water. This needs special care in handling, as it is very corrosive and poisonous. It should be mixed in a wooden vessel, and applied as rapidly as possible with a can, which must be washed out directly after use.

(6) Patent weed killers of various descriptions, of which many are advertised.

Bent Grass (*Agrostis vulgaris* and *A. alba*. Nat. Ord. Gramineæ).—Perennial; tufted or creeping. In the latter case it roots freely as it spreads. Leaves flat, rather rough on the upper side. Flowers very small, borne on a slender, dainty, branched head called a panicle, which is sometimes spreading, sometimes close, and often tinged with brown. Flowers throughout summer. Height, 2–24 ins.

Means of Control.—Constant hoeing, hand pulling, and entire removal of plants by digging.

Bindweed (*Convolvulus arvensis*. Nat. Ord. Convolvulaceæ).—Perennial, with slender, creeping underground stems, climbing by means of twining aerial stems. Leaves stalked, rather heart-shaped. Flowers bell-shaped, white or pink. Fruits containing four large seeds. The twining stems tend to strangle the plants up which they clamber, and to pull them to the ground in many cases. Flowers summer.

Means of Control.—Underground stems should be dug out and burned, and all green stems be pulled up or hoed out whenever seen.

Black Bindweed (*Polygonum Convolvulus*. Nat. Ord. Polygonaceæ).—Annual; climbs by means of twining stems. Leaves heart-shaped. Flowers white or pink, in loose, stalked clusters. Fruits black, triangular. Flowers summer and autumn.

Means of Control.—Constant hoeing, and hand pulling where necessary.

Uses.—The seeds are very similar to those of buckwheat, and have been used for the same purposes, including the preparation of flour for human consumption.

Black Nightshade (*Solanum nigrum.* Nat. Ord. Solanaceæ).—Usually annual, sometimes biennial. Stems angular; much branched. Leaves stalked and angular. Flowers small, white, and in clusters. Fruit a black berry. Flowers summer and autumn. Height, under 2 ft.

Means of Control.—Constant hoeing.

Buttercup.—See Creeping Buttercup.

Chickweed (*Stellaria media.* Nat. Ord. Caryophyllaceæ).—Annual. A much-branched trailing plant with opposite leaves and small white flowers. Forms an abundance of seed, and is often very troublesome in kitchen gardens. Can be recognised by a row of hairs that runs up one side of the stem from leaf to leaf, and then changes its position to the opposite side between the next pair of leaves. Flowers practically all the year round.

Means of Control.—Constant hoeing.

Coltsfoot (*Tussilage Farfara.* Nat. Ord. Compositæ).—Perennial, with stout creeping underground stems. Leaves heart-shaped and radical, the undersides covered with white cottony down; appear after the flowers. Flower heads pale yellow; arise on separate stems, with small leaves or scales arranged on the stalks. Fruits with a pappus or tuft of hairs or plumes, which aid in distribution by the wind. Flowers early spring.

Means of Control.—The underground stems should be removed as much as possible during cultivation, and the flower heads be cut early to prevent seeding. The weed is often associated with poor soil, and judicious manuring may help to eradicate it in such cases.

Common Orache (*Atriplex patula.* Nat. Ord. Chenopodiaceæ).—Annual, varying much in height and habit. Numerous branches, which come off at right angles to the stem and to one another. Leaves stalked and angled, with broad bases, often covered with a whitish meal. Flowers greenish and insignificant, in slender spikes. This is a most variable plant in every way. The colour may be anything from a very deep green to a light whitish-green, though it is rarely as white as Fat Hen, which it often resembles rather closely. Flowers summer and autumn.

Means of Control.—Constant hoeing.

Common Sow-thistle (*Sonchus oleraceus.* Nat. Ord. Compositæ).—Annual. A strong growing, succulent plant, with prickly leaves and a milky juice which exudes whenever any part is broken. Leaves have no stalks and clasp the stem with their broad bases. Flower heads numerous, flat, pale yellow. Fruits with a tuft of hairs or plumes, by which they are scattered by the wind. Flowers summer and early autumn. Height, 1–3 ft.

Means of Control.—Constant hoeing. If any plants become established they should be dug out, as the roots are stout and run deeply in the ground.

Couch Grass (*Agropyron repens*, or *Triticum repens.* Nat. Ord. Gramineæ).—Perennial. One of the most pestilent of grasses. It is easily recognised by the white or brownish creeping underground stems which send out roots and aerial stems from every joint. The growing tip is characteristically sharp and pointed, and is well adapted for piercing its way through the soil or even through any obstacle that comes in its way, provided it be not too hard. Flowers summer. Height, 1–2 ft.

Means of Control.—This weed should be dug out and destroyed whenever seen. It is useless merely to pull up the green tops, as fresh shoots constantly arise from below ground, and every joint can produce a new plant if it be broken off.

Uses.—Makes a useful compost if decomposed with lime. The underground stems can be used as fodder for farm stock, as horses and cattle will eat them readily, and they may also be fed to pigs. They contain much nutritive matter which can be extracted in the form of a starchy powder resembling arrowroot, suitable for human food.

Creeping Buttercup (*Ranunculus repens*. Nat. Ord. Ranunculaceæ). —Perennial. A creeping plant that roots at the joints or nodes from which the leaves spring. Leaves divided, with the top segment removed to a little distance from the lower two. Flowers yellow, closely resembling those of the common tall buttercup. Fruits numerous, arranged in clusters at the top of the flowering stalk. Plant is covered with scattered soft hairs. Flowers summer and autumn.

Means of Control.—Constant hoeing and removal by digging.

Creeping Thistle (*Cnicus arvensis*. Nat. Ord. Compositæ). — Perennial, with creeping underground stems. A very prickly plant. Leaves spiny, cut up at edges. Flowering heads dull purple, several on a stem. Fruits small, plumed. Plant spreads partly by the plumed fruits, but chiefly by the creeping underground stems. Flowers summer. Height, 2–4 ft.

Means of Control.—See Bindweed.

Uses.—The seeds of the thistle family are a favourite food of small, hard-billed birds, especially goldfinches.

Daisy (*Bellis perennis*. Nat. Ord. Compositæ). — Perennial. Leaves rather spoon-shaped with toothed edges, arranged in a rosette pressed flat on the ground. Flowers crowded into solitary close heads, the outer florets being white, tipped with pink, and the inner florets bright yellow. Fruits not provided with plumes. Flowers practically all the year round. Height, about 2 ins.

Means of Control.—Hoeing and hand weeding.

On Lawns.—Great improvement in weedy lawns may be effected by dressing in spring with sulphate of ammonia at the rate of 1 lb. per square rod, mixed with fine dry soil. This application may be repeated every month from April to July.

If a pinch of salt or sulphate of ammonia be placed in the crown, the weed will be poisoned and die off, but this has the disadvantage of making unsightly patches and leaving the large roots in the soil. It is better to root out as many weeds as possible, not merely cutting them off below the surface. If large bare patches are left they should be raked over, scattered with fine soil and resown with grass seeds.

Dandelion (*Taraxacum officinale*. Nat. Ord. Compositæ).—Perennial. Roots long, thick, and tapering. Leaves in a rosette, long, rather narrow, edges cut into triangular lobes which generally point downwards. Flowers yellow, crowded into solitary heads. Fruits rather prickly, plumed, carried by the wind. Whole plant possesses a milky juice. Flowers spring and autumn. Height, usually 6–8 ins.

Means of Control.—*On Lawns*. —See Daisy.

On Paths.—See Annual Meadow Grass.

Uses.—Blanched leaves can be eaten as salad. In some places the roots are dried, roasted, and ground for use as a substitute for coffee. They are also much used in medicine.

Deadnettle.—See RED DEADNETTLE.

Dock (*Rumex sp.*, usually *R. crispus* and *R. obtusifolius*. Nat. Ord. Polygonaceæ).—Perennial, with stout rootstocks penetrating the ground to some distance. Leaves stalked, rather large, with thin membranous stipules which form sheaths round the stems. Flowers numerous, but rather insignificant, usually reddish, clustered on more or less branched stems. In the fruit the winged perianth persists as a covering to the three-angled nut, which is usually dark brown in colour. Flowers summer. Height, 2–3 ft.

MEANS OF CONTROL. — Hand pulling to remove the entire plant is the only effective remedy. Extra deep rooting plants may have to be lifted with a fork.

Enchanter's Nightshade (*Circaea lutetiana*. Nat. Ord. Onagraceæ).—Perennial, with creeping underground stems. Leaves opposite, stalked, heart-shaped, thin and downy. Flowers very small, white or pink, somewhat resembling London Pride in appearance. Fruits two seeded, covered with small hooks. This is not a very common weed in gardens, but is exceedingly troublesome where it occurs, on account of the persistent vitality of the underground stems. Flowers summer. Height, 1–1½ ft.

MEANS OF CONTROL.—See BINDWEED.

Fairy Rings are caused on lawns by various kinds of fungi, chiefly toadstools. A multitude of delicate branched white threads, called mycelium, spread through the soil and periodically throw up fruiting bodies, which are familiarly known as toadstools. As the mycelium spreads outwards from a central point, and the fruiting bodies arise from the youngest part, on the outer edge, a ring is formed. The fairy rings can be traced even when no toadstools are visible, as the grass near the edge is usually of a very dark green colour.

MEANS OF CONTROL.—Slaked lime should be applied at the rate of 1–2 tons per acre. As fairy rings often indicate poverty of soil, infested lawns should be well manured. The Board of Agriculture has recommended 1 ton of slaked lime applied in winter; 3–4 cwt. of superphosphate, 3 cwt. kainit, 4½ cwt. nitrate of soda in early spring; followed by 1–2 cwt. superphosphate and 1 cwt. nitrate of soda in late spring (quantities given are per acre). If lawns are damp, sulphate of ammonia may well be used instead of nitrate of soda.

Fat Hen (*Chenopodium album*. Nat. Ord. Chenopodiaceæ).—Annual. Leaves stalked and rather variable in shape, simple. Flowers in dense, leafy spikes, greenish, unattractive. Fruits dark coloured and bun-shaped, remaining enclosed in the floral envelope. Plant is very pale green and is usually covered with a white meal, especially on the flowers and underneath the leaves. Flowers summer and autumn. Height, 1–2 ft.

MEANS OF CONTROL. — Constant hoeing and hand weeding.

USES.—Pigs will eat it greedily, and sheep and cattle do not dislike it. In some parts of Eastern England and in Scotland it is occasionally boiled for use as a vegetable. Commercially the seeds are valuable in the manufacture of shagreen.

Fool's Parsley (*Æthusa Cynapium*. Nat. Ord. Umbelliferæ).—Annual. Leaves finely divided. Flowers white, arranged in flat heads called umbels, with two or three narrow reflexed green leaflets or bracts at the base of each cluster of flowers. Poisonous, and not very common as a garden weed. Flowers summer and autumn. Height, 1–2 ft.

MEANS OF CONTROL.—Constant hoeing.

Goosegrass (*Galium Aparine.* Nat. Ord. Rubiaceæ).—Annual. Stems long and straggling. Leaves simple, long and narrow, arranged in whorls of six or eight. Flowers white and inconspicuous, followed by ball-like fruits. The whole plant scrambles by means of reflexed hooks which occur on every part. Flowers summer and autumn.

MEANS OF CONTROL.—Constant hoeing and hand pulling.

USES.—In Sweden the seeds are dried, roasted, and used as a substitute for coffee, and the dried plant is sometimes infused in hot water to make a herb tea. From very ancient times the rough stalks have been used as a filter for straining milk, and this still survives in country districts in England when a proper sieve is not available. A red dye has been obtained from the roots.

Goutweed (*Ægopodium Podagraria.* Nat. Ord. Umbelliferæ).—Perennial, with creeping underground stems. Leaves coarse, compound, with segments in threes. Flowers numerous, white, arranged in crowded umbels. Where this weed is allowed to spread it carpets the ground densely and chokes out everything else. Flowers summer. Height, 1–1½ ft.

MEANS OF CONTROL.—See BINDWEED.

Greater Bindweed (*Calystegia sepium.* Nat. Ord. Convolvulaceæ).—Perennial, clambering over hedges and bushes, spreading by creeping rootstocks. Stems slender. Leaves stalked, large, rather triangular and pointed. Flowers large, white, and bell-shaped. Fruits containing four seeds. Flowers summer.

MEANS OF CONTROL.—See BINDWEED.

Greater Plantain (*Plantago major.* Nat. Ord. Plantagineæ). — Perennial, with a short, stout rootstock. Leaves grow from the ground-level in the form of a rosette, from the middle of which the slender flowering spike rises. Leaf stalks grooved. Leaves often 5 ins. long, broad and oblong, marked with five, seven, or nine strong ribs. Flowers small and greenish, arranged closely along the flowering stalk. Fruits containing several irregular dark coloured seeds. Flowers summer and autumn. Height may reach 1 ft.

MEANS OF CONTROL.—*On Lawns.*—See DAISY.

On Paths.—See ANNUAL MEADOW GRASS.

USES.—Seeds are much valued as food for cage birds. The leaves have certain healing properties, and have been applied to wounds.

Groundsel (*Senecio vulgaris.* Nat. Ord. Compositæ).—Annual. One of the most pestilent garden weeds. Erect and branching. Leaves cut up, rather irregularly lobed. Flowers yellow, in numerous tiny heads. Fruits provided with plumes, by which the seeds are scattered far and wide by the wind Flowers all the year round. Height, 6–12 ins.

MEANS OF CONTROL.—Constant hoeing or hand pulling. It is specially important to prevent this weed from seeding.

USES.—Is much employed as a food for cage birds. The plant was once much in favour for medical purposes, but it has now fallen into disuse.

Hoary Plantain (*Plantago media.* Nat. Ord. Plantagineæ).—Perennial, with a short, branched root.

stock. Leaves downy, marked with five or seven ribs, no leaf stalks, arranged in a rosette lying close to the ground. Flowers in a short, dense spike, silvery green, with pink stamens. When it occurs on lawns all the vegetation under the leaves is destroyed. Flowers June to October. Height may reach 8 ins.

MEANS OF CONTROL.—*On Lawns.* —See DAISY.

On Paths.—See ANNUAL MEADOW GRASS.

USES.—See GREATER PLANTAIN.

Horsetail (*Equisetum arvense.* Nat. Ord. Equisetaceæ).—A leafless perennial, spreading by underground stems. Aerial stems are hollow, jointed, and brittle, with a sheath at each joint from which ten or twelve branches spring. Fruiting stems are unbranched and appear in the spring, being succeeded by the branched barren stems.

MEANS OF CONTROL.—See BINDWEED.

USES. — Plant contains many coarse particles and is very useful for polishing tin vessels, hard woods, brass, etc. This species, among others, has been much used by dairymaids in the North of England for polishing their milk pails. An allied species has been imported from Holland under the name of DUTCH RUSHES.

Knot-grass (*Polygonum aviculare.* Nat. Ord. Polygonaceæ).—Annual, creeping. Stems much branched and wiry. Leaves small and simple. Flowers pink or red, in tiny clusters at the bases of the leaf stalks. Fruits triangular, black. Flowers May to October.

MEANS OF CONTROL.—Constant hoeing.

USES.—Pigs are fond of Knotgrass, and it is often made into hay in Alsace. In Japan a blue dye resembling indigo is manufactured from this plant.

Meadow Grass. — See ANNUAL MEADOW GRASS.

Moss.—This name is given to a group of small plants varying in height from half an inch upwards, which consist of a fine stem and delicate green leaves but do not bear flowers or seeds. Instead of these a fruiting capsule is produced, containing a large number of tiny spores, which are scattered by the wind, and spread the plant from place to place.

MEANS OF CONTROL.—The presence of moss on lawns usually indicates bad drainage or poverty of soil. A mossy lawn should be well raked to remove as much moss as possible, and should then be dressed with a mixture of one part of lime to four parts of soil, together with a little artificial manure. The lawn should be kept well rolled. Good results have been obtained by first watering with a 5 per cent. solution of sulphate of iron, and then sprinkling frequently with a weak (3 per cent.) solution of nitrate of soda.

Nettle.—See RED DEADNETTLE and STINGING NETTLE.

Nightshade.—See BLACK NIGHTSHADE and ENCHANTER'S NIGHTSHADE.

Orache.—See COMMON ORACHE.

Persicaria (*Polygonum persicaria.* Nat. Ord. Polygonaceæ).—Annual. Stem branched. Leaves long and narrow, usually with a dark spot in the middle. There is a fringed membranous sheath round the stem at each joint, formed by the stipules or appendages to the leaves. Flowers pale pink or red, in rather dense clusters. Upper part of the plant often turns red. Flowers summer and autumn. Height, 1–2 ft.

MEANS OF CONTROL.—Constant hoeing.

Petty Spurge (*Euphorbia Peplus.* Nat. Ord. Euphorbiaceæ).—A low-growing annual, repeatedly branched from the base. Leaves small, simple, and alternate, without leaf stalks. A forked, three-rayed umbel of greenish flowers occurs at the end of almost every branch. Fruit a three-seeded capsule. Whole plant contains a milky juice. Flowers summer and autumn. Height, 1 ft.

MEANS OF CONTROL.—Constant hoeing.

Pimpernel.—See SCARLET PIMPERNEL.

Plantain.—See GREATER PLANTAIN, HOARY PLANTAIN, and RIBWORT PLANTAIN.

Red Deadnettle (*Lamium purpureum.* Nat. Ord. Labiatæ).—Annual. Stems square. Leaves stalked, heart-shaped, toothed, and opposite. Flowers in whorls at the base of the upper leaf stalks, reddish-purple, hooded. Fruits plentiful, four nutlets being formed from each flower. Flowers April to October. Height, about 1 ft.

MEANS OF CONTROL.—Constant hoeing.

Ribwort Plantain (*Plantago lanceolata.* Nat. Ord. Plantagineæ).—Perennial, with a short, thick, and branched rootstalk. Leaves long and narrow, with three or five ribs, arranged in a rather erect rosette. Flower stalks long, bearing a short, close head of greenish flowers. Fruits two-seeded. Flowers spring to autumn. Height may reach 1 ft.

MEANS OF CONTROL.—*On Lawns.*—See DAISY.

On Paths.—See ANNUAL MEADOW GRASS.

USES.—The seeds of various kinds of plantain are surrounded by mucilage, which is used for stiffening muslin.

Scarlet Pimpernel (*Anagallis arvensis.* Nat. Ord. Primulaceæ).—Annual. A much-branched trailing plant with smooth, opposite leaves and bright scarlet flowers which close at the approach of rain (hence the name POOR MAN'S WEATHER GLASS). Seed vessels open by a circular cap; seeds numerous. Flowers May to October.

MEANS OF CONTROL.—Constant hoeing.

Shepherd's Purse (*Capsella Bursa-pastoris.* Nat. Ord. Cruciferæ).—Annual. Leaves more or less cut up, very variable in shape, arranged in a rosette, from the middle of which arises a flowering stalk bearing numerous insignificant white flowers. Fruits heart shaped, splitting into two boat-like pieces to allow the numerous seeds to escape. Flowers practically all the year round. Height about 1 ft.

MEANS OF CONTROL.—Constant hoeing and hand weeding.

USES.—Was originally boiled and eaten as greens, and in some parts of North America it has been sold in the markets for this purpose.

Sow-thistle.—See COMMON SOW-THISTLE.

Spurge.—See PETTY SPURGE and SUN SPURGE.

Stinging Nettle (*Urtica dioica.* Nat. Ord. Urticaceæ).—Perennial, with creeping underground stems. Leaves opposite, simple, and deeply toothed. Flowers inconspicuous, greenish, in drooping tassels at the bases of the upper leaf stalks. Pollen and seeds are usually borne on different plants. Seed abundant. Whole plant is covered with stinging hairs. Flowers summer and autumn. Height, 2–3 ft.

MEANS OF CONTROL.—See BINDWEED.

USES.—A most valuable plant. The fibrous stems are converted into cordage, fishing-lines, and even textile fabrics and sewing thread. A decoction of nettles and common salt makes a good rennet for coagulating milk. The young tops are boiled and eaten as spinach, and the chopped-up leaves are said to encourage egg laying if they are fed to fowls. In Sweden nettles are cultivated as fodder for farm animals, which eat them readily when dried. A dye is obtained from the roots, which gives a yellow colour to wool when boiled with alum.

Sun Spurge (*Euphorbia helioscopia.* Nat. Ord. Euphorbiaceæ).—Annual. Little branched. Leaves alternate, simple, notched at the edge, rounded at the tip. Flowers golden-green, in a flat, five-rayed umbel at the top of the stem. Fruit a three-seeded capsule. Whole plant contains a milky juice. Flowers the whole season. Height, 6–12 ins.

MEANS OF CONTROL.—Constant hoeing.

USES.—Is used for removing warts. It is said to cure toothache if the juice be rubbed on the skin behind the ear.

Thistle. — See COMMON SOW-THISTLE and CREEPING THISTLE.

Twitch or **Twitch-Grass.**—These names are often applied to BENT GRASS and COUCH GRASS, which see.

In addition to the weeds described above, various other kinds may occasionally be met with as garden weeds, and in certain cases, under specially favourable circumstances, an unusual weed may be exceedingly troublesome.

As a general rule the plants should be prevented from forming seed by constant hoeing. Annual weeds can be easily kept down in this way; but with perennial plants as much as possible of the underground stem or root system should be removed by digging or trenching, as they spread more readily by vegetative reproduction than by seed formation.—W. E. B.

[It should be noted that the English and Botanical names in the above article are those in general use, and do not necessarily conform to the newer nomenclature adopted at Kew.—EDITOR.]

WEEDS AND WEEDING.

When Chickweed chokes our flowers and plants,
And Nightshade over food crops pants,
The gardener must use his hand,
And pull these weeds from out the land.

When Dandelion thrives and blooms,
And Bindweed over all else looms,
With Couchgrass, Nettles holding sway,
We need a fork, and that to-day.

Where Creeping Buttercup is seen,
We have to fork to keep land clean.
The same with that Convolvulus,
We dig it up with little fuss.

Fat Hen comes up quite quick by hand,
And so does Groundsel from the land.
Not so the Greater Bindweed, or
The Horsetail weed we often saw.

The last two weeds are terrors true,
At least to me, and you will rue
If they are left to romp about,
When every scrap should be dug out.

The Pimpernel and Shepherd's Purse—
These weeds are very little curse—
Are easily pulled up by hand,
Especially if soil be sand.

The Thistles—truly awful weeds,
Don't speak to me of Thistles' seeds—
Need scything down before they bloom,
And burning is, of course, their doom.

The Sun Spurge, but a lowly plant,
Is not the subject for much cant;
The same applies to Celandine:
They decompose to humus fine.

A naughty weed is Stinging Nettle,
It stings to show its own high mettle.
We glove our hands, or grasp it tight,
And jerk its roots out to the light.

And there are many other weeds,
Too many for the gard'ner's needs.
Some weeds are terrors, some are not,
But all on neatness form a blot.

And ev'ry weed where'er it lie,
A robber is of blackest dye.
A fact, but seldom recognised,
Which often makes me quite surprised.

Then let us each with hand and hoe,
Or fork or spade, move down each row,
And knock the weeds up with a will,
Then quickly our big barrow fill.

The weeds with long tap-roots or seed
Must burn to ash, our plants to feed.
All others in a hole may rot
To give us humus pure and hot.
E.

WEEDS ON PATHS.—See *GARDEN PATHS.*

WEEPING ASH (*Fraxinus excelsior pendula*).—See *TREES.*

WEEPING INDIAN CEDAR (*Juniperus recurva*).—See *TREES.*

WEEPING OAK (*Quercus pedunculata*).—See *TREES.*

WEEPING SPRUCE (*Picea breweriana*).—See *TREES.*

WEEPING WILLOW (*Salix babylonica*).—See *TREES.*

WEIGELA.—A synonym of DIERVILLA. See *SHRUBS.*

WEIGHT OF BUSHEL.—See *ARITHMETIC AND GARDENING.*

WEIGHTS AND MEASURES.

Although it is perhaps natural that every trade and profession should have methods of computation peculiar to itself, it is doubtful if there is one in which such a variety exists as in horticulture. Technical terms are, of course, inseparable from any particular industry, but one would think that in the twentieth century some attempt should be made to standardise as much as possible all commodities that are sold by weight or measure. Apart from the "tricks" that are in all trades (except our own), it would be a great convenience if standard weights and measures could be established for the sale of fruits and vegetables, seeds, and perhaps manures and certain classes of sundries. So far as flowers and many kinds of vegetables are concerned it may be impossible to establish anything approaching a standard, as the articles are so varied in nature and in bulk. For example, take the term "bunch." It is used in every conceivable way and for a great variety of saleable stuft, but can any one define what a "bunch" is? The difficulty will be at once apparent when one mentions a bunch of, say, carnations, forget-me-nots, gypsophila, lilies-of-the-valley, carrots, onions, radishes, turnips, etc. Again, take the well-known term "bundle." Look at the difference between a "bundle" of rhubarb in January and a bundle of rhubarb in May. One is vastly bigger than the otner. The terms "bunch" and "bundle" are, therefore, undefinable in practice. At the same time, everyone who sells flowers or vegetables in bunches or bundles knows very well just about how large or how small a bunch of any particular subject has to be to secure a ready sale in the market.

But even when we come to recognise measures that are supposed to be "standard" ones, we find totally different meanings attributed to them in different parts of the kingdom; or the same kinds of produce are sold in different ways, and in quite different measures. Some of these measures are well known in some parts of the country, but are quite unknown in other parts. Thus the "bushel" and "half-bushel"—also known as the "sieve" and "half-sieve"—is universally used in the London markets for measuring apples, gooseberries, pears, plums, etc. But in the midlands and northern markets the "pot" is the recognised standard of measure for similar articles, while in Glasgow and the West of Scotland the "sleek" becomes the measure. In London, raspberries (except when sold to jam manufacturers) are offered in "punnets," but in other places in "gallons" or "pecks." Tomatoes are sold in "strikes" holding 12 lb. nett, but are also sold in pecks or other measures in different weights. Strawberries are sent to market in "chip" baskets supposed to hold 4 lb. nett, but the "nett," as often as not, includes the weight of the basket. Mushrooms are sold in punnets holding 1 lb., also in "strikes" or peck baskets. Mustard and cress (the well-known "hot and cold" of the market) is always sold in punnets, but there is no comparison beyond the name between the mustard and cress "punnet" and the "punnet" in which seakale is sold.

Taking the larger vegetables and salads, cabbages, etc., are sold by the "tally"—a measure meaning five dozen. Cabbages as "greens," however, are sold in bushels or boxes, while cauliflowers may be sold by the tally, and in "crates," or other measures holding a definite number. Lettuces are sold by the score, but a "score" of lettuces numbers 22 and not 20. The same applies to endive. Spinach is sold by the bushel, but there is no recognised weight, so much depending upon the method of packing. The same applies to sorrel, and one must be careful not to secure a good weight at the cost of sadly bruising the tender leaves. Rhubarb is sold in bundles, as already mentioned, but there is no recognised number of "sticks" or stalks to the bundles. Celery is sold in "rolls" which may contain six, eight, or twelve "heads" or plants. Radishes, turnips, leeks, and carrots are sold in "bunches," but the number of roots to a bunch varies considerably with the period of the year and the ruling prices. Carrots are also sold by the "bag" weighing perhaps a cwt. or more, but they are also sold by the bushel or half-bushel, and other measures in different localities. The same applies to parsnips and often to beetroot. The last named is, however, an article by itself, as it is often sent to market already cooked, and is then sold by number. Potatoes are sold in sacks containing 1 cwt. (dirt and all), but also by the bushel, half-bushel, peck, gallon, quarter,[1] pottle, or pound when retailed. Jerusalem artichokes are usually sold in half-bushels holding about 28 lb., and brussels sprouts are sold in the same way, but only about 15 or 16 lb. go to the half-bushel well heaped up.

It will thus be seen from what has been outlined above that to attempt anything like "standardisation" of weights and measures for horticultural produce is by no means a light task. What might be done with advantage in many cases would be to sell by "weight" when possible and not by "measure." Everyone understands the exact meaning of a pound, a cwt., and a ton. But when bushels, sieves, pots, strikes, bundles, etc., are used, the weight may be anything at all according to the nature of the goods. There is of course nothing unfair in using these measures, but care should be taken to see that they should all be of standard size, and not of different sizes, some larger or smaller than others.

If a man buys 1000 bushels of apples or 1000 half-bushels of plums or cherries, he naturally expects that each measure holds approximately the same weight. That, however, only appertains if the article is also the same variety. It is well known that all apples are not of the same weight or solidity. A bushel of one variety, therefore, will weigh more or less than a bushel of another variety. But with this reservation similar measures of any one variety of fruit should contain about the same weight.

Fertilisers, Manures, and Soils.—Much confusion often arises as to what is meant by bushels of soil, fertilisers, or manures. The directions to add so many bushels of this or that to a ton of soil, or conversely to add so much fertiliser to so many bushels of soil, are constantly occurring in the press, but as far as we are aware no list of weights of these common materials has ever been published. It has thus been thought useful to determine by actual experiment the approximate weights of a number of these materials, and although, of course, incomplete, the list which follows covers, we think, the majority of materials that the amateur is likely to handle. Here it should be remembered that 8 gallons go to a bushel, and 4 pecks one bushel, so that these equivalents can easily be found if wanted, though it would be waste of space to give separate columns to them in this work. The weights given are, of course, approximate; the actual weights depending so much on the amount of moisture in the materials at the time of weighing.

TABLE OF WEIGHTS OF BUSHELS, OF FERTILISERS, MANURES, AND SOILS.

Material.	Weight of Bushel, lb.
Alum	84
Bacterised Peat	29
Basic Slag	80–100
Black Leather Dust	28
Black Sulphur	82
Blue Vitriol	100
Bone Dust or Flour	56
Bone Phosphate	144
Bonemeal	56
Bones, Burnt	89
Building Sand	132
Calcined Magnesia	15
Carbonate of Magnesia (Heavy)	40
Carbonate of Magnesia (Light)	12
Carbonate of Soda (Crystallised)	64
Catch Pit Refuse (Dried)	54

---

[1] This "quarter" is a quarter of a peck, not a quarter of a cwt. It is a measure never heard of in the south of England.—EDITOR.

Material.	Weight of Bushel, lb.
Chalk (Ground)	100
Chalk (Lump)	96
Cinder Ashes	40
Copper Sulphate	100
Desiccated Fish Guano	55
Dried Tank Sewage Sludge	40
Epsom Salts	82
Fish Guano	40–50
Fish Manure	50–56
Flour of Sulphur	78
Flue Dust	40–50
Fresh Pressed Sludge Cake	48
Gaslime	56
Glaubers Salts	72
Green Vitriol	68
Ground Chalk	100
Ground Lime	56
Guano	50–56
Guano, Fish	40–50
Guano, Ichthemic	62
Guano, Native	40–66
Gypsum	60
Heavy Carbonate of Magnesia	40
Horn Dust	10
Horn Shavings	9
Iron Sulphate	68
Ivory Dust	45
Kainit	56–60
Leaf-mould	46
Leather Dust (Black)	28
Leather Dust (Red)	20
Light Carbonate of Magnesia	12
Lime	56
Limestone	106
Loam	72
Maiden Loam	60–70
Muriate of Potash	56–60
Nitrate of Lime	80
Nitrate of Potash	56–60
Nitrate of Soda	56–60
Nitrolim or Nitrolime	80
Old Sewage Sludge Cake	64
Peat	76
Phosphate of Lime	92
Phosphate of Potash	82
Phosphate of Soda	68
Pigeon Manure	66
Potting Loam	74
Poultry Manure	66
Pressed Sewage Sludge (Fresh)	48
Pressed Sewage Sludge (Dried)	38
Proprietary Fertilisers	56–72
Quicklime	80
Red Leather Dust	20
Roll Sulphur	99
Salt	65
Saltpetre	96
Sand, Building	132
Sand, Silver	130
Seaweed	40
Shoddy	18
Slaked Lime	74
Sludge Cake	48
Soot	25–30
Spent Hops	40
Sulphate of Ammonia	57
Sulphate of Iron	68
Sulphate of Lime	60
Sulphate of Magnesia	82
Sulphate of Potash	120
Sulphate of Soda	72
Sulphur, Black	82
Sulphur, Yellow	78
Superphosphate of Lime	56–62
Tank Sludge (Dried)	40
Tricalcium Phosphate	92
Vegetable Humus	46
Washing Soda	60
Wood Ashes	40–50

Fruit.—The following tabulation will give some idea of the variation in weight of a "bushel" or half-bushel of fruit, the figures given being approximate as tested in most cases by actual weighing.

TABLE OF FRUIT MEASURES WITH THEIR EQUIVALENT WEIGHTS.

Fruit.	Bushel or Sieve.	Half-Bushel or Half-Sieve.
Apples	40–45 lb.	20–22 lb.
Cherries	36–40 ,,	18–22 ,,
Gooseberries	40–48 ,,	20–24 ,,
Pears	56–60 ,,	28–30 ,,
Plums	48–52 ,,	24–26 ,,

Vegetables.—In the following table the weights of measured quantities of Vegetables are given, which will again show great variation. The cwt. of any vegetable is always 112 lb., so a column devoted to that is unnecessary. It should, however, be specially noted that the "Quarter" mentioned in the case of Vegetables is not the same as the "Quarter" for Manures. That for Vegetables is a quarter of a peck, and that for Manures is a quarter of a cwt. It must also be noticed that a peck, though by some regarded as the same as a stone, is by no means always equal to it in weight owing to the difference in the articles weighed.

[TABLE

TABLE OF VEGETABLE MEASURES WITH THEIR EQUIVALENTS.

Vegetable.	Weight of Bushel	Weight of Peck.	Weight of Stone.	Weight of Quarter.
	lb.	lb.	lb.	lb.
Artichokes, Jerusalem	56	14	14	5
Beans, Broad, Pods	32–40	8 –10	14	1½–2¼
,, ,, Seeds.	50	12½	14	3
,, French ,,	60	15	14	3¾
,, ,, Pods	36–40	9 –10	14	2¼–2½
,, Kidney ,,	36–40	9 –10	..	..
,, Runner ,, [1]	26–30	6½– 7½	14	2 –4
,, ,, Seeds	50–51	12½–12¾	14	3
Beetroot	40	10	14	2½
,, Seed	36–40	9 –10	14	3½
Brussels Sprouts	30–32	7½– 8	14	4
,, Seeds	56–60	14 –15	14	3½
Cabbage Seed	56–60	14 –15	14	3½
Carrots [2]	50–56	14½–16	14	6½–7
,, Seed	40–50	10 –13	14	3½
Cauliflower Seed	56–60	14 –15	14	3½
Colewort Seed	56–60	14 –15	14	3½
Dandelion, Leaves	20–28	5 – 7	14	1–2
,, Seed	...	...	14	3½
Garlic	48	12	14	3
Mushrooms	...	...	14	3½
Mustard Seed	60	15	14	3¾
Onions	52–64	13 –16	14	3–4
,, Seed	...	...	14	3½
,, Sets	48	12	14	3
Parsnips	50–56	12½–14	14	3–3½
Peas, Pods	40–48	11 –12	14	2
,, Seeds	64	16	14	4
Potatoes, Eating	84	21	14	5–5¼
,, Seed [3]	56	14	14	3½
Radish Seed	56	14	14	3½
Shallot Sets	48–56	12	14	3
Sorrel	12–20	3 – 5	14	1–1½
Spinach, Leaves	20	5	14	1–1½
,, Beet	20	5	14	1–1½
,, Beet Seed	36–40	9 –10	14	3½
,, Seed	36–40	9 –10	14	3½
Swedes	45	11¼	14	3½
,, Seed	56	14	14	3½
Turnips	50–56	12½–14	14	3
,, Seed	56–60	14 –15	14	3½

---

[1] In some cases, as will be seen, the peck is approximately half a stone, and the quarter a quarter of a stone, but this is the exception rather than the rule.—EDITOR.

[2] Here the weight of the peck is approximately two stones or a quarter of a cwt., and the quarter is approximately half a stone.—EDITOR.

[3] This is another case of the absurdity of our Weights and Measures. To have a difference of 7 lb. between pecks of different kinds of potatoes provides food for mirth and ridicule to many foreign countries.—EDITOR.

Water Measures.—If the previous tables contain many strange differences, the water measures contain more, and it is a problem too difficult for us to answer why a hogshead of water should not contain as many gallons as a hogshead, say, of methylated spirits. Again, the terms barrel, cask, and hogshead are at times considered synonymous, but they all contain a different number of gallons. It seems childish to measure spirit in one way and water in another, but it is done. Again, grave confusion arises on account of the Noggin or Gill being considered to contain half a pint instead of a quarter.

TABLE OF WATER MEASURES WITH WEIGHTS IN POUNDS.

(Two Glasses = One Noggin or Gill; Four Gills = One Pint.)

Pints.	Quarts.	Gallons.	Barrels.	Casks.	Hogsheads.	Weight of Water in lb.
1	½	⅛	..	..	..	1¼
2	1	¼	..	..	..	2½
8	4	1	..	..	..	10
288	144	36	1	..	..	360
320	160	40	..	1	..	400
432	216	54	1½	..	1[1]	540

The table above is useful for estimating the weight of any quantity, say, a gallon of soot. Weigh a pint, multiply by 8 and you have it.

Miscellaneous Measures. — Besides the water measures there are others, For instance, there are two DRY MEASURES—one for measuring coal, and one for corn and seeds. That used for corn and seeds is also used for measuring manures and fertilisers, but at times the other is used, so confusion arises. The IMPERIAL HEAPED MEASURE, as the one for coal is called, has 8 gallons in each bushel, 3 bushels to a sack, and 12 sacks to the chaldron. The following table shows the various equivalents of the dry measure. Great care must be taken not to confuse "one load" with "one ton," as they are often quite different,[2] the former may contain over 1000 lb. more than the latter.

The table below will prove a

TABLE SHOWING DRY MEASURE WITH WEIGHTS IN POUNDS.

Pint.	Quart.	Pottle.	Gallon.	Peck.	Bushel.	Quarter.	Load.	Weight of Water in lb.
1	½	¼	⅛	..	..	..	..	1¼
2	1	½	¼	⅛	...	..	..	2½
4	2	1	½	¼	..	..	..	5
8	4	2	1	½	⅛	..	..	10
16	8	4	2	1	¼	..	..	20
64	32	16	8	4	1	⅛	1/40	80
512	256	128	64	32	8	1	1/5	640
2560	1280	640	320	160	40	5	1	3200

[1] One hogshead of spirits, or indeed any other liquid save water (and beer), contains 63 gallons, while casks and barrels are of many capacities.—EDITOR.

[2] The weight of a cartload of anything varies between wide limits. A cartload of feathers would weigh very little. A cartload of flue dust weighs 12–15 cwt., while one of sand will weigh about 22–25 cwt. The "load" in our table is from the Imperial Corn Measure by which eating potatoes are measured in some parts of the country. The weight of a load of these is 3360 lb., not 2240 lb as in a ton.—EDITOR.

ready means of ascertaining the weights of any bulk quantities of fertilisers which may not be in our previous table. Thus, for instance, if the gardener is instructed to apply a bushel of a certain fertiliser, and he has not got a bushel measure, all he need do is carefully to weigh a pint, multiply the result by 64, and he has got what he requires. He can then proceed to weigh out the fertiliser instead of having to measure a pint out 64 times. A way of quickly finding the weight of a bushel may also be useful: First estimate the number of ounces in a pint of the material, multiply by four, and call the result pounds instead of ounces, and it will be the weight in pounds of a bushel of the material.

LINEAL MEASURE. — Having disposed of measures of capacity, we now come to measures of length. Here, again, as many gardeners know to their cost, calculations are made as difficult as they can be owing to our awkward constants. Every gardener, of course, knows that 12 ins. make one foot, and 3 ft. one yard, but where fathoms, leagues, links, etc., and such like are spoken of many are "at sea." The following table shows the relations of all lineal measures one to another :—

TABLE SHOWING AT A GLANCE RELATIONS OF LINEAL MEASURES TO EACH OTHER.

Inches.	Hands.	Links.	Feet.	Yards.	Fathoms.	Poles.	Chains.	Furlongs.	Miles.	Leagues.
1	1/4	1/8	1/12	1/36	1/72	..	..	..	..	..
4	1	1/2	1/3	1/9	1/18	..	..	..	..	..
8	2	1[1]	2/3	2/9	1/9	..	..	..	..	..
12	3	1 1/2	1	1/3	1/6	..	..	..	..	..
36	9	4 1/2	3	1	1/2	..	..	..	..	..
72	18	9	6	2	1	..	..	..	..	..
198	49 1/2	24 3/4	16 1/2	5 1/2	2 3/4	1	..	..	..	..
800	200	100	66	22	11	4	1	..	..	..
..	2000	1000	660	220	110	40	10	1	..	..
..	..	8000	5280	1760	880	320	80	8	1	..
..	..	..	15840	5280	2640	960	240	24	3	1

MEASUREMENTS OF AREA.—We now come to measures of area. These are by no means as simple as they might be, but the following table shows the relation of one to another, the largest and most awkward numbers being purposely omitted :—

TABLE SHOWING AT A GLANCE RELATION OF SQUARE MEASURES TO EACH OTHER.

Square Inches.	Square Links.	Square Feet.	Square Yards.	Square Poles.	Square Chains.	Square Roods.	Acres.
62 3/4 nearly	1	..	..	..	..	..	..
144	2 1/3 nearly	1	..	..	..	..	..
1,296	20 2/3 nearly	9	1	..	..	..	..
39,204	625	272 1/4	30 1/4	1	..	..	..
..	10,000	4,356	484	16	1	..	..
..	..	10,890	1210	40	2 1/2	1	..
..	..	..	4840	160	10	4	1

---

[1] For all practical purposes one link may be taken as 8 ins.—EDITOR.

SOLID MEASUREMENT.—It often happens that gardeners want to know the equivalents of bushels, gallons, etc., in cubic feet. As far as we are aware no such data has yet been published in works of gardening reference, and in books on mathematics it is usually put in too obscure a manner to be easily understood. The following table, however, will clearly show the relation of these one to another.

WEIGHTS and AREAS.—Another matter on which the gardener often wants information is that of transferring ounces per square yard into cwts. per acre. Here the inconvenience

TABLE OF EQUIVALENTS OF CAPACITY MEASURES WITH SOLID MEASURES.

Cubic Inches.	Quarts.	Gallons.	Pecks.	Cubic Feet.	Bushels.	Barrels.	Casks.	Hogsheads.	Quarters.	Cubic Yards.
65	1	..	..	..	..	..	..	..	..	..
277	4	1	..	..	..	..	..	..	..	..
554	8	2	1	..	..	..	..	..	..	..
1,728	25⅗	6⅖	3⅕	1	..	..	..	..	..	..
2,216	32	8	4	1⅕	1	..	..	..	..	..
9,972	144	36	18	5⁵⁄₁₂	4½	1	..	..	..	..
11,080	160	40	20	5⅝	5	1⅑	1	..	..	..
14,958	216	54	27	8	6¾	1½	1⁷⁄₂₀	1	..	..
17,728	256	64	32	9¹³⁄₂₇	8	1⁷⁄₉	1⅗	2¹⁰⁄₂₇	1	..
39,988	593⅕	148⅘	74⅖	27	18⅗	4	3⅗	2⅖	1⅕	1

TABLE SHOWING WEIGHTS REQUIRED FOR VARIOUS AREAS.

N.B.—The actual equivalents, especially in the tons per acre column, involve the use of very small fractions, hence we give round numbers instead of them, where possible.

Oz. per Sq. Yard.	Lb. per Sq. Pole.	Lb. per Sq. Chain.	Cwt. per Sq. Chain.	Cwt. per Rood.	Cwt. per Acre.	Tons per Acre.
1	2	32	—	⁵⁄₇	2¾	⅐
2	4	64	—	1³⁄₇	5½	²⁄₇
3	6	96	—	2⅐	8¼	³⁄₇
4	8	128	1⅐	2⁶⁄₇	11	⁴⁄₇
5	10	160	1³⁄₇	3⁴⁄₇	15	¾
6	12	192	1⁵⁄₇	4²⁄₇	18	⁹⁄₁₀
7	14	224	2	5	20	1
8	16	256	2²⁄₇	5⁵⁄₇	25	1¼
9	18	288	2⁴⁄₇	6³⁄₇	25	1¼
10	19	320	2⁶⁄₇	7⅐	30	1½
11	22	352	3⅐	7⁶⁄₇	35	1¾
12	24	384	3³⁄₇	8⁴⁄₇	36	1⅘
13	26	4 6	3⁵⁄₇	9²⁄₇	40	2
14	28	448	4	10	40	2
15	30	480	4²⁄₇	10⁵⁄₇	45	2¼
16	32	512	4⁴⁄₇	11³⁄₇	48	2⅖
17	34	544	4⁶⁄₇	12⅐	50	2½
18	36	576	5⅐	12⁶⁄₇	55	2¾
19	38	608	5³⁄₇	13⁴⁄₇	55	2¾
20	40	640	5⁵⁄₇	14²⁄₇	60	3
32	64	1024	9⅐	22⁶⁄₇	110	5½
40	80	1280	11³⁄₇	28⁴⁄₇	120	6
48	91	1536	13⁵⁄₇	34²⁄₇	140	7
50	94	1600	14²⁄₇	42⁶⁄₇	150	7½

of our present system is shown up more than in any other case. There are, as is well known, 16 ounces to each lb., 14 lb. to the stone, 28 lb. to the quarter, and 112 lb. to the cwt., but these bear no relation to the fractions of an acre. We saw in a previous table, that 30¼ sq. yds. were equal to a sq. pole, perch or rod, that 40 poles equalled one rood, and that 4 roods were one acre. An acre, we found, was 4840 sq. yds. As there is no relation evident from the above, we have worked them out and give them in the table on p. 1182.

J. W., S. B. L., & E. T. E.

WELLINGTONIA (*Sequoia gigantea*).—See *TREES*.

WELSH POLYPODY (*Polypodium vulgare cambricum*).—See *FERNS AND FERN GARDENING*.

WELSH POPPY (*Meconopsis cambrica*). See *TREES*.

WENTWORTH WEEPING ASH (*Fraxinus excelsior pendula Wentworthi*).—See *TREES*.

WESTERN ALLSPICE (*Calycanthus occidentalis*).—See *SHRUBS*.

WESTERN CATALPA (*Catalpa cordifolia*).—See *TREES*.

WESTERN POLYPODY (*Polypodium vulgare*).—See *FERNS AND FERN GARDENING*.

WESTFELTON YEW (*Taxus baccata Dovastoni*).—See *TREES*.

WEYMOUTH PINE (*Pinus Strobus*). See *TREES*.

WHAU-WHI.—The genus PLAGIANTHUS. See *SHRUBS*.

WHEAT.—See *TRITICUM*.

WHEELBARROW.—See BARROW for reference.

WHIN (*Ulex*).—See *SHRUBS*.

WHIP CACTUS (*Cereus flagelliformis*).—See *CACTI*.

WHIP GRAFTING.—See under GRAFTING in *PROPAGATION OF PLANTS*.

WHITE ALDER (*Alnus rhombifolia*). See *TREES*.

WHITE ALDER (*Clethra acuminata*).—See *SHRUBS*.

WHITE ASH (*Fraxinus americana*), **WHITE BASSWOOD** (*Tilia heterophylla*), **WHITE BEAM** (*Fraxinus americana* and *Pyrus Aria*), **WHITE BIRCH** (*Betula pubescens*), and **WHITE CEDAR** (*Cupressus thyoides*).—See *TREES*.

WHITE CURRANT (*Ribes rubrum album*).—See *BUSH FRUITS*, also under RIBES in *SHRUBS*.

WHITE ELM (*Ulmus americana*).—See *TREES*.

WHITE FLIES.—See under CABBAGE WHITE FLY in *INSECT PESTS*.

WHITE HEATHER (*Calluna vulgaris alba*).—See *HEATHS*.

WHITE HELLEBORE (*Veratrum album*).—See *VERATRUM*.

WHITE HELLEBORE POWDER.—A powder obtained from the root of *Veratrum album*. See *VERATRUM*.

WHITE HOREHOUND.—A name applied to *MARRUBIUM*, which see.

WHITE LIME (*Tilia argentea*).—See *TREES*.

WHITE MAN'S FOOTPRINT (*Plantago major*).—See *PLANTAGO*, and under GREATER PLANTAIN in *WEEDS*.

WHITE MULBERRY (*Morus alba*).—See *TREES*.

WHITE OAK of Kew (*Quercus alba*).—See *TREES*.

WHITE PASSION FLOWER (*Passiflora coerulea Constance Elliott*).—See *CLIMBING AND TRAILING PLANTS*.

WHITE POPLAR (*Populus alba*).—See *TREES*.

WHITE RUST OF CRUCIFERS.—See *DISEASES OF PLANTS*.

WHITE SPANISH BROOM (*Cytisus albus*).—See *SHRUBS*.

WHITE SPRUCE (*Picea alba*).—See *SHRUBS*.

WHITE TURK'S CAP.—A decorative Gourd. See *ORNAMENTAL GOURDS*.

WHITE WILLOW (*Salix alba*) and **WHITEHORN** (*Crataegus Oxyacantha*).—See *TREES*.

WHITLAVIA.—See *PHACELIA*.

WHITLOW CRESS.—See *CRESS* and *LEPIDIUM*.

WHITLOW GRASS.—See *DRABA*.

WHORL-FLOWER (*Morina longifolia*).—See *MORINA*.

WHORTLEBERRY (*Vaccinium Myrtillus*).—See *SHRUBS*.

WICHURAIANA ROSE (*Rosa wichuraiana*).—See *ROSE SPECIES*. For the best varieties see under HYBRID WICHURAIANA ROSES in *ROSE CLASSES*.

WICKER WORK.—See *GARDEN FURNITURE*.

WILD BANKS.—See *BANKS*.

WILD BASIL (*Calamintha Clinopodium*).— This is a plant of very little garden value.

WILD BERGAMOT (*Monarda fistulosa*).—See *MONARDA*.

WILD BLACK CHERRY (*Prunus serotina*).—See *TREES*.

WILD BRITISH BLACKBERRY.—See *BRAMBLES AND BERRIES*.

WILD CHAMOMILE.—See under CHAMOMILE in *MEDICINAL HERBS*.

WILD CHERRY (*Prunus Cerasus*).—See *TREES*.

WILD GARDENING.

The term "Wild Garden" is applied to the placing of hardy plants in places where they will take care of themselves. It does not mean the picturesque garden, for a garden may be picturesque and yet in every part the result of ceaseless care. What it does mean is best explained by the Winter Aconite flowering under a grove of naked trees in February; by the Snowflake abundant in meadows by the Thames; and by the Apennine Anemone staining an English grove blue. I wish the idea to be kept distinct from the various important phases of hardy plant growth in groups, beds, and borders, in which good culture may produce many happy effects; from the rock garden or borders reserved for choice hardy flowers; from growing hardy plants of fine form; and from the ordinary types of spring garden. In the smaller class of garden there may be little room for the wild garden; but in the larger gardens, where there is often ample room on the outer fringes of the lawn, in grove, park, copse, or by woodland walks or drives, beautiful effects may be created by its means.

Many hardy flowers will thrive better in rough places than ever they did in the old mixed border. Even small ones, such as the Ivy-leaved Cyclamen, are naturalised and spread all over the mossy surface of the woods. In consequence of plant, fern and flower, with climber, grass and trailing shrub, relieving each other, they will look better than in stiff gardens. No ugly effects will result from decay and the swift passage of the seasons; it will enable us to grow many plants that have never yet obtained a place in our "trim gardens"—multitudes that are not showy enough for a place in the flower-garden. Among the plants often thought unfit for garden cultivation are a number, such as the Asters and Golden Rods (*Solidago*), which overrun the choicer border-flowers when planted among them. To these might be added plants like the Winter Heliotrope, and many others which, while interesting in the flower garden, are apt to spread so rapidly as to become a nuisance.

In this way we may settle the question of spring flowers, as well as that of hardy flowers generally; and many parts of the grounds may be made alive with spring flowers, without in the least interfering with the flower garden itself. An example or two of what has already been done with Daffodils may serve to show the way and explain the gains of the wild garden, and there is no more charming flower to begin with than the Narcissus, which, while fair in form as any orchid or lily of the tropics, is as much at home in our climate as the kingcups in the marsh and the primroses in the wood. And when the wild Narcissus comes with these, in the woods and orchards of Northern France and Southern England, it has also for companions the violet and the cowslip, hardiest children of the north, blooming in and near the stiff, leafless woods. This fact should lead us to see that it is not only a garden flower we have here, but one which may give much beauty to our woods and fields or meadows as well as to the pleasure grounds. In our country in many places there is room to grow them in other ways than in the garden proper, and this is not merely in country seats, but in orchards and cool copses, and by woodland rides. To chance growth in such places, we owe it already that many Narcissi or Daffodils, which were lost to gardens in the period when hardy plants were wholly set aside for bedding plants, have been preserved to us, at first probably in many cases thrown out with the garden refuse. In many places in Ireland and the West of England, Narcissi lost to gardens have been found in old orchards and meadows.

There are many gardens in the kingdom which are disfigured by vain attempts to grow trees, shrubs, and flowers that are not really hardy, and it would often be much wiser to devote attention to things that are absolutely hardy in our country, like most Narcissi, to which the severest winters make no difference; and we know from their distribution in Nature how fearless they are in this respect. Three months after our native kind has flowered in the weald of Sussex and in the woods or orchards of Normandy, many of its allies are beneath the snow in the mountain valleys of Europe, waiting till the summer melts the deep snow. Soils which are cool and stiff and not favourable to a great variety of plants, suit Narcissi perfectly. On the cool mountain marshes and pastures, where the snow lies deep, the plant has abundance of moisture —one reason why it succeeds better in our cool soils. In any case it does so, and it is mostly in dry, light soils that Narcissi fail.

At the same time we may be mistaken as to failures which now and then arise from other causes than the soil. I planted, years ago, some Bayonne Daffodils on the northern slopes of a poor field, and thought the plants had perished, as so little was seen of them after the first year. Despairing of the slope, it was planted with Alder, a tree which grows in any cool soil. Years afterwards, walking through the Alder, I found the Bayonne Daffodil in perfect bloom.

As to the kinds we may naturalise with advantage, they are almost without limit, but generally it is better to take the groups of Star Narcissi, the Poets, and the native Daffodil, of which there are so many varieties. We can be sure that these are hardy in our soils, and, moreover, as we have to do this work in a bold way, we must deal with kinds that are easiest to purchase.

There is hardly any limit except the one of rarity, and we must for the most part put our rare kinds in good garden ground till they increase, though we have to count with the fact that in some cases Narcissi that will not thrive in a garden will do so in the grass of a garden or orchard. The fine distinct effect of Narcissi in groups in the grass should not be forgotten. It is not only their effect near at hand that charms us, but as we walk about we may see them in the distance in varying lights, sometimes through and beyond the leafless woods. And there is nothing we have to fear in this charming work save the common sin of overdoing. To scatter Narcissi equally over the grass everywhere is to destroy all chance of repose, of relief, and of seeing them in the ways in which they often arrange themselves. It is almost as easy to plant in pretty ways as in ugly.

How to Plant.—I usually plant Narcissi in grass by turning back the sod, making two cuts with the spade at right angles, and then pressing the sod up and back, laying it back on a hinge, as it were, putting in a few bulbs, mostly round the sides of the hole, turning the sod back, and treading firmly upon it. The question is largely one of convenience and the ground one has to plant. If one could improve the subsoil it would be better for some soils, no doubt, but if the work is done in a bold way and there is much other planting going on, it is not easy to get time to plant things in the grass with care. Sometimes, in breaking new ground or carrying out changes, one gets a chance of throwing in some bulbs before the surface is levelled up. Once, in planting Grape Hyacinths in an uneven grassy slope, they were placed on the turf in the hollows, and then levelled up with earth, and both grass and bulbs soon came through. In certain soils seeds may be sown betimes—seeds of Foxglove, Evening Primrose, and stout biennials. Fragile bulbs will want more care, and less depth than the bolder Narcissi. All planting in the grass should be in natural groups or prettily fringed colonies, growing to and fro as they like after planting. Lessons in this grouping are to be had in the woods, copses, heaths, and meadows, by those who look about them as they go. At first many will find it difficult to get off formal masses, but they may be got over by studying natural grouping of wild flowers. Once established, the plants soon begin to group themselves in pretty ways.

The Soil.—In the cultivation of hardy plants, and especially in wild gardening, the important thing is to find out what subjects really do in the soil, without which much good way cannot be made. Many people make errors in planting things that are tender in our country, and very often fail in consequence; but apart from such risky planting, perfectly hardy plants may disappear, owing to some dislike of the soil. They flower feebly at first and afterwards gradually wane, in spite of all our efforts. I have made attempts to establish spring Snowflakes (*Leucojum vernum*) in grass, none of which succeeded, owing to the cold soil, yet one of the Snowflakes in the Thames Valley grows with the vigour of a wild plant. The Narcissus, which is so free and enduring in cool, damp soil, does little good on warm, light, or chalky soil. What will do or not do is often a question of experience; and the point is, when we see a plant doing well in soil like our own, to take the hint.

People often complain of the texture of the grass as a cause of failure, yet I have thousands of the Tenby Daffodil, and have had them for ten years, in rich and rank masses of Cocksfoot and other coarse grasses in coverts never mown or the old grass taken away at any time, and the Narcissus gets better year by year. So it is a question of finding out the plant the soil will grow. Some things are so omnivorous in their appetites that they will grow anywhere; but some, the more beautiful races of bulbous and other early flowers, will only thrive and stay with us where they like the soil. It should be clearly seen, therefore, that what may be done with any good result in the wild garden cannot be determined beforehand, but must depend on the nature of the soil and other circumstances, which can be known only to those who study the ground.

Flowers Beneath Trees.—Where the branches of trees, both evergreen and summer-leafing, sweep the turf in pleasure-grounds, many pretty spring-flowering bulbs may be naturalised beneath the branches, and will thrive without attention. It is chiefly in the case of deciduous trees that this can be done; but even in the case of Conifers and evergreens, some graceful objects may be dotted beneath the outermost points of their lower branches. We know that a great number of our spring flowers and hardy bulbs mature their foliage and go to rest early in the year. In spring they require light and sun, which they obtain abundantly under the summer-leafing tree; they have time to flower, and grow under it before the foliage of the tree appears. Then, as the summer heats approach they are overshadowed, and go to rest; but the leaves of the trees once fallen, they soon begin to reappear and cover the ground with beauty.

W. R.

WILD GOAT'S TREE (*Galega officinalis*).—See *GALEGA*.

WILD GOOSE PLUM (*Prunus hortulana*).—See *TREES*.

WILD HYACINTH (*Camassia Fraseri*). See *CAMASSIA*.

WILD INDIGO (*Baptisia tinctoria*).—See *BAPTISIA*.

WILD MADDER (*Rubia peregrina*).—See *RUBIA*.

WILD MARJORAM (*Origanum vulgare*).—See *ORIGANUM*, and under MARJORAM in *POTHERBS*.

WILD NUT.—See under COBNUT, FILBERT, AND HAZEL in *NUT CULTURE*.

WILD OATS (*Avena fatua*).—See *AVENA*. See also ANIMATED OR WILD OATS under *A. sterilis* in *ORNAMENTAL GRASSES*.

WILD ORANGE (*Prunus caroliniana*). See *TREES*.

WILD PARSNIP (*Peucedanum sativum*).—See *PEUCEDANUM*.

WILD PEAR (*Pyrus communis*).—See *TREES*.

WILD PIE PLANT (*Rumex hymenosepalus*).—See *RUMEX*.

WILD PLUM (*Prunus communis*).—See *TREES*.

WILD RASPBERRY.—See WILD RED RASPBERRY for reference.

WILD RED CHERRY (*Prunus pensylvanica*).—See *TREES*.

WILD RED PLUM (*Prunus americana*). See *TREES*.

WILD RED RASPBERRY (*Rubus strigosus*).—See *SHRUBS*.

WILD ROSEMARY (*Andromeda polifolia*).—See *SHRUBS*.

WILD SERVICE TREE (*Pyrus Torminalis*).—See *TREES*.

WILD STRAWBERRY (*Fragaria vesca*).—See *FRAGARIA* and *STRAWBERRIES*.

WILD TEASEL (*Dipsacus sylvestris*). See *DIPSACUS*.

WILD THYME (*Thymus Serpyllum*). See *THYMUS*.

WILD TULIP (*Tulipa sylvestris*).—See *TULIP SPECIES*.

WILD YELLOW PLUM (*Prunus americana*).—See *TREES*.

WILLOW.—For the best sorts see SALIX in *TREES*.

WILLOW GENTIAN (*Gentiana asclepiadea*).—See *GENTIANA*.

WILLOW HERB (*Epilobium*).—See *EPILOBIUM* and *WATER GARDEN; PLANTS FOR THE*.

WILLOW OAK (*Quercus Phellos*).—See *TREES*.

WILSONARA.—See *ORCHIDS*.

WINDFLOWER.—See *ANEMONE*.

WINDOW GARDENING.

The cultivation of a few plants in a sunny window appeals to almost everyone, but more particularly those having no greenhouse; and although the number of really choice plants which could be relied upon to pass through a severe winter in an ordinary living-room without fire-heat through the night is necessarily somewhat limited, with ordinary care a room may be kept bright at all seasons of the year.

Possibly the chief reason why so many window gardeners fail to get the full benefit either of flowers, or beautiful healthy looking foliage, is owing to the fact that they will insist upon following a set rule for watering, instead of giving this only when the plant really is in need of it, the result being that a plant which at the time of its introduction to the window was to all intents and appearances a perfect specimen, soon becomes sickly in appearance, a welcome prey to insects, and if not taken in hand by others having more experience comes to an untimely end.

Certain people fail to maintain their window plants in a healthy condition by giving water only in a spasmodic way, which when dealing with the majority of plants can have but one end—stunted growth, and early loss of beauty, if not actual death.

But perhaps the plan most generally followed by the more timid class of window gardeners is, to act upon the little-and-often principle, which perhaps is the least desirable of all.

If window gardening is to be a success, the plants should be given into the care of one person only. It is when all members of the household are interested, but no one directly responsible, that the most disastrous results follow; but where the person in charge of these is really interested, and tries hard to keep the plants in health throughout the year, there is no reason why most of the plants mentioned below should not be equally as attractive when grown in the window ledge, or in the case of some stood on a stool some little distance away from the window, as others grown in a cool greenhouse or conservatory.

As a guide to watering, we may at once say, no hard-and-fast rules can be laid down; the temperature of the room and the number of the roots made by the plant very largely determine this, but the observance of the few hints below will largely help to keep the plants in a healthy state.

When potting, always leave a good margin for water.

Allow ample drainage, and keep the bottom hole open.

Pot very firmly, leaving the surface level.

Never use soil for potting which is dust dry.

Never use soil in a sodden condition.

When re-potting, if the soil is dry, give a good watering an hour before.

Always bury the stems of the plant a trifle deeper than before.

Should a plant get dust dry, stand in a pail of water for a quarter of an hour.

Should a plant have an overdose of water and show signs of distress, stand away from bright sun for a few days.

When in doubt, don't water. It is far easier to bring a half-starved plant back again to a healthy state than one persistently over-watered.

Do not give stimulants of any kind to a plant until the pot is well filled with roots, and in the case of flowering plants, discontinue to give manures after the flowers begin to open.

A good general soil for window plants is three parts good turfy loam, one part old manure, one part leaf-soil, and an eighth silver sand.

Always use clean pots, which should be thoroughly dry before filling, and when new ones have to be used, soak these in water for half an hour.

Window Gardening Plants : PLANTS EASILY RAISED FROM SEED. — *Agathaea coelestis*, Begonias, Calceolarias, Cinerarias, Cockscombs, *Francoa ramosa*, Mimulus, Petunias, Primulas, Solanums.

ORNAMENTAL PLANTS FROM SEED. —Acacia, *Aloysia citriodora*, Aralia, *Asparagus Sprengeri*, *Dracæna indivisa*, Eucalyptus.

PALMS.—*Cocos Wedelliana*, *Geonoma gracilis*, *Kentia Belmoreana*, *Kentia Forsteriana*, *Phœnix Ropicela*, *Phœnix reclinata*, and *Phœnix Robelini*. In addition to these there is quite a large family of Dracæna ; nearly all of what are termed cool greenhouse varieties will do equally well in an ordinary living-room where plenty of light and air reaches the plant.

The well-known *Aspidistra lurida variegata* is perhaps the most easily managed of all popular plants available for large windows, its nearest rival being the Asplenium, or Pteris Ferns, while of late years, *Araucaria excelsa* has made many friends among window gardeners. *Coronilla glauca* and *Diplacus glutinosus* make splendid specimens for a large window, while nearly all the more popular members of the Cactus tribe will flourish if not over-watered.

The above by no means exhausts the list of excellent material for window decoration ; in fact, where proper attention is given, many of the best known occupants of small greenhouses will flourish here.

In order that growth may be even, it is very desirable that plants intended as specimens be turned round occasionally, in order that growth may be the same on all sides.

During frosty weather the plants should be taken from the window as the fire declines, or, failing this, place several sheets of paper between the plants and the window.—F. R. C.

[Should the soil turn sour owing to over-watering, and re-potting be impossible, a good watering with lime-water will probably put matters right.—EDITOR.]

WINEBERRY.—See *BRAMBLES AND BERRIES*.

WINGED ELM (*Ulmus alata*).—See *TREES*.

WINGED EVERLASTING (*Ammobium alatum*).— See AMMOBIUM in *EVERLASTING FLOWERS*.

WINTER ACONITE.—See *ERANTHIS*.

WINTER BEDDING.—See Lists of SPRING OR WINTER BEDDING PLANTS under *BEDDING PLANTS : SELECTED LISTS OF*.

WINTER BEDDING SCHEMES.—See *BEDDING SCHEMES FOR SUMMER AND WINTER*.

WINTER BLOOMING ROCK PLANTS. See ROCK PLANTS FOR WINTER BLOOMING in *ROCK PLANTS FOR ALL PURPOSES*.

WINTER CHERRY.—See *PHYSALIS*.

WINTER CRESS (*Barbarea*. Nat. Ord. Cruciferæ).—This is a small family of hardy herbaceous plants of easy culture. The most useful is *B. praecox*, popularly known as AMERICAN CRESS, a water plant useful for Salads. The best known is *B. vulgaris*, the COMMON WINTER CRESS, a weedy plant of no garden value. The double variety is grown by some as the DOUBLE YELLOW ROCKET.

WINTER DAFFODIL (*Sternbergia lutea*).—See *STERNBERGIA*.

WINTER DIGGING.—See *ALLOTMENTS : MANAGEMENT OF*.

WINTER-FLOWERING BULBS (For the Rock Garden). — See *ROCK GARDEN BULBS*.

WINTER-FLOWERING STOCKS.—See *STOCKS*.

WINTER GARDEN, THE.

Every gardener is of the opinion that the winter is the dullest and idlest time of the whole year, many, especially amateurs, having said to the present writer, "Oh, there is nothing to do in the garden now, so it is no good going out into it." However, certain things must be done in the winter which cannot well be done at any other time; thus there is no need to be idle, and little occasion to be dull.

An amateur once told the writer a long story about the difficulties of winter gardening. He was one of the kind who wished to get his digging done before Christmas, and that year it appeared that the Clerk of the Weather had conspired against him, and all other gardeners and allotment-holders alike. Every day, so this amateur said, the Clerk sent either rain, snow, or hail. One night it blew his greenhouse down; the next night it blew his frame into the next garden; the following night it blew his cloches away and broke most of them against a stone wall, and then the Clerk of the Weather tried to blow his house down. He terminated his story by asking me how he could work under such great disadvantages? Of course, in cases of that kind, it is not possible to carry out the work one would wish, and as one sits at home hearing the wind and rain beat against the windows, or watching the snow fall thick and fast early in December, one's spirits are apt to sink at the prospect of the work not getting done by the time it should be done. The black earth which one picks up by the pound on one's boots, when working on allotments, or in small gardens during December, seems very far removed indeed from the lovely colour borders or useful vegetable plots of June, July, and August. However, when the wrath of Nature has abated, we can, at least, be ready to take advantage of those fine days that come, and get to work on the land.

Digging.—Naturally one's thoughts first turn to digging. We cannot get good results in either flower or vegetable gardening unless we thoroughly dig, delve, and manure the soil. Deep digging and early digging are of very great importance, and very few gardeners realise the necessity of doing the work really thoroughly. Trenching, too, is an operation which cannot be done except during the winter, and as this operation takes up a considerable time, the earlier it is started the better. Proper trenching will take at least a month, if an acre is to be done, on a light soil, and it will take very much longer if the soil is of a strong, heavy nature. Bastard trenching will take about a week or ten days less for the same area.

Applying Artificials. — Another matter of importance in the early winter is the application of certain artificial fertilisers which cannot well be put on the land at any other time, if the results are to be worth the dressing. Such artificials include Basic Slag, Calcium Cyanamide (though this last may also be used in the early spring), various salts of Magnesia, as well as Kainit, Bone Flour, Bonemeal, Bone Phosphate, Flue Dust, and Wood Ashes. It would be out of place to describe here the best purposes to which these artificials are applied, as these matters are fully dealt with in the earlier parts of this work.

Getting in Compost.—The winter is also the best time for getting in supplies of the various composts such as turf, and so on. There is no time to bother about obtaining these materials in the spring, and also there is no opportunity then with pressure of extra work, for the proper stacking of them. Readers should turn to our article on *Composts* for various notes on these matters. While one is getting in composts, supplies of manure should be obtained in addition to those required for immediately digging into the ground. Few gardeners realise the enormous increasing value of very old stable or cow manure for potting purposes, or for digging in round the roots of choice subjects in the herbaceous border.

Seed Lists.—The seed list should also be made out not later than the beginning of January, and usually this is no small matter. The various points in favour of one variety or another must be weighed up carefully, so as to be sure of getting that variety which is most suitable for any given purpose. Seed catalogues should be studied most carefully, almost every winter evening until the order has been sent, and the descriptions of the various flowers and vegetables should not be too seriously read unless the gardener only buys from the bigger firms. It is an open secret among horticulturists that these descriptions are often not accurate, and that a new variety with a glorious description, which is published in a catalogue, may be merely a well-known variety under another name. We need hardly add that gardeners should not put cost first, but they should buy the best seeds only, and be willing to pay a fair price for them, since cheap seeds are not usually satisfactory as regards germination.

Planning Next Year's Garden.—This is a most interesting and necessary job in the winter. Plant lists from specialists should be carefully studied, also the known varieties commended by the Royal Horticultural Society. Any notes which the gardener has made during the summer for future planting should be gone through, and care taken that no choice sort is missed. During the winter evenings we can work out the colours with more care than is possible in the busy spring planting time, and we need hardly say that carefully planned borders are much more likely to give pleasure to the gardener and his friends, than are borders in which the colours are mixed up anyhow. Here the making of, and the working to, a plan is strongly to be recommended in order that the colours may be correctly placed. When making a plan do not, however, keep strictly to what is known as "height sequence." Have a few bold subjects towards the front.

This by no means exhausts the work for the winter, but it covers the more important matters. Those gardeners with a greenhouse should turn up the section on WINTER MANAGEMENT in the article on *Greenhouse: Management of.*

E. T. E.

WINTER GLADIOLUS.—See *Kaffir Lily.*

WINTER GREEN.—See *Pyrola.*

WINTER GREENS.—See *Greens: Winter and Summer.*

WINTER HELIOTROPE.—See *Water Garden: Plants for the.*

WINTER HELIOTROPE (*Petasites fragrans*).—See *Petasites.*

WINTER JASMINE (*Jasminum nudiflorum*).—See *Climbing and Trailing Plants.*

WINTER LETTUCE.—See *Lettuce.*

WINTER MOTHS.—See *Insect Pests.*

WINTER ROT.—See under Dry Rot in *Potato Diseases.*

WINTER SAVORY.—See under Savory in *Potherbs,* also see *Satureia.*

WINTER SPRAYING.—See *Fruit Trees : Spraying.*

WINTER SWEET.—The genus Chimonanthus and *C. fragrans.* See *Climbing and Trailing Plants* and *Shrubs.*

WINTERBERRY (*Ilex verticillata*).—See *Holly.*

WINTERGREEN.—See *Medicinal Herbs,* also the genus Gaultheria in *Shrubs.*

WIRE NETTING.—See *Garden Netting.*

WIREWORMS.—See *Insect Pests.*

WIRING OF WALLS.—This is dealt with in *Garden Walls.*

WISTARIA.—For the best species see *Climbing and Trailing Plants.*

WITCH HAZEL.—The genus Hamamelis, *H. arborea* and *H. virginica.* See *Shrubs.*

WITCHES' THIMBLE (*Silene maritima*).—See *Silene.*

WITHE ROD (*Viburnun nudum*).[1]—See *Shrubs.*

WOAD.—See *Isatis.*

WOBURN WINTER WASH.—See *Insect Pests : General Methods of Destruction.*

WOLF-BERRY (*Symphoricarpus occidentalis*).—See *Shrubs.*

WOLFSBANE.—See under Aconite in *Medicinal Herbs.*

WOMEN GARDENERS.

In dealing with the subject of Gardening as a career for women, it would be a pleasure to dwell simply on the attractive side of the subject, if only because it affords such a broad field of interest and such endless opportunities for ability and skill. But to enjoy gardening as a hobby and to practise it as a profession are widely different things. The one presupposes a taste only : the other demands vocation—with all that the word implies.

And if the true gardener is born, she must certainly also be made—and by this we mean to imply thorough training, grafted on a healthy disregard to comfortable conditions and an unlimited capacity for hard work.

A foundation of capability being assumed, it is well to decide as to the probable branch of gardening which will best suit the individual to take up. To make a success of "Landscape Gardening"—the much-abused name must be employed until a better be found—a woman gardener should have the best sort of technical training for this difficult craft, plus an inborn feeling for colour, form, and line. She will be fortunate if an opportunity offers to enter an architect's office ; but failing this, as sound a knowledge as possible of mathematical drawing should be obtained, and every possible opportunity taken in the practice of Design.

It is in this matter of Design that the Horticultural Training Colleges need just now to look especially to the needs of their pupils. They have rightly given of late years a vast amount of attention to the importance of (literal) spade-work. But it is obvious that, beyond all which is included in this, any special talent that a woman possesses must not stand in danger of being overlooked. It is, of course, important that a woman should be able to carry out every practical operation in a garden, in case no other help is available, but it is equally important that she should be possessed of certain special *fortes,* without the exercise of which it is by no means clear as to why she should receive higher pay than a man. In a word, the woman gardener ought to be able to command good prices by reason of her unmistakable *value,* whether it be as organiser of a gardening business, as horticultural instructor, or as garden designer and consultant. And in the rôles of garden designer and consultant, her work may well be found in establishing that better tradition of which the newer English gardens stand so badly in need and which cannot fail to have its influence from the large estate down to the suburban strip of ground.

The College Course.—To come now to the consideration of practical training for the gardening profession, this should take up not less than two years or, better still, three, and be followed by continental travel if possible. Now that the war is over, a definite stand must be made against the "Short Course" worker, since she can be no expert, as she has not had the time and opportunity to study her subject under varying conditions. A woman gardener deserving real success should first qualify by taking a thorough training in her craft—following upon the best type of High School education, in which drawing, science, and handicrafts have played a preparatory part.

---

[1] *Viburnum cassinoides* of Kew.—Editor.

Typical Training Centres.—It will be useful here to mention a few typical examples of gardening courses. Needless to say, other good training colleges exist in plenty; and the proper agencies to which to apply for information on the subject are the Central Bureau for Women's Employment and the Women's Farm and Garden Union—which latter is also the recognised society for representing the interests of both women farmers and women gardeners, and to which a social and residential Club for the benefit of members has been recently attached.

The Horticultural Department of University College, Reading, offers a careful and practical training on University lines, both in the manual work and in its scientific bearings. Students may enter either for the "Certificate," "Diploma," or "Diploma with Distinction" Course, of two and three years respectively.

At Swanley Horticultural College (Kent) and at Studley College (Warwickshire), a special feature has always been made of market work, for which the large area of ground and glass-houses give ample opportunity. The courses of instruction at Swanley and Studley extend normally over two and three years, and afford opportunities for specialising on the scientific side of gardening, in Nature Study with a view to teachers' training, in Colonial work, and in many other branches. Nature Study in relation to gardening is further represented at the School of Gardening at Clapham, near Worthing (Sussex).

The excellent exhibits frequently seen at shows are a recommendation of the market work and specialisation in intensive French gardening as practised at the Thatcham Fruit and Flower Farm at Newbury (Berks).

An intending woman gardener whose home is in Ireland will be fortunate if she be one of those allowed the privilege of receiving a training in return for her services at the Royal Botanic Gardens, Glasnevin, Dublin. In Wales, the chief centre of gardening training is at Aberystwyth. This is in connection with the University.

For a girl who can live in or near London and to whom it is convenient to attend daily, rather than to reside in College, the Royal Botanic Society's Practical Gardening School, held in their Gardens at Regent's Park, is excellent, supplying sound practical training under skilled instructors on most careful lines. Produce from the kitchen and flower gardens is not sent to market, as the work to a great extent resembles that of a large private garden, with the special advantage, in addition, of grounds devoted to "botanical" and economic plants. The students take part in every kind of work, excellent experience being afforded them in the propagating department and in flower gardening in and out of doors. The kitchen garden, which has been recently enlarged, also affords good experience in that department of which the war has shown us the immense importance, whether as small-holders or as teachers and superintendents.[1]

Some Openings for Women Gardeners.—Training completed, the question clamours for a definite answer: "What is my future as a gardener to be?" The following remarks are intended to give some indication of the openings available:—

Private Service.—In this the duties are included of a small or a large garden, undertaken either single-handed or with help. Although not generally well paid, such posts provide very useful experience, and the life is usually a pleasant if a distinctly strenuous one for the worker. An under-gardener's place on the staff of a large "place" with a first-class head gardener (preferably, as a rule, a man) is, of course, one of the most advantageous opportunities for the freshly trained but not very experienced woman gardener to take.

---

[1] It may be remarked here that at some gardening colleges the tendency is to make the course too light and pleasant. Young women have confessed to the editor that they had the happiest of times at their colleges but that when they came to take posts they found gardening a very different matter, for then the hard work started. College authorities might with great advantage remedy this matter and let their students "know the worst" long before they leave to start on their own.—Editor.

NURSERY AND MARKET GARDENS.—In these branches a woman gardener will almost invariably look forward to owning eventually "her own place." It may be pointed out, however, that in whatever line of work she may be employed, the all-round experience of a good nursery will be found invaluable.

JOBBING GARDENING.—The management of a nursery apart from a market garden involves less risk than the latter, owing to the fact that the grower is dealing with stuff which does not cease to be marketable at a given moment. Nursery work, moreover, can be combined with other departments of gardening, more especially with the working up of a consulting practice, or with the business of what is inelegantly known as "jobbing gardening." For both of these last, a proper knowledge of Design should first be acquired. But in the second type of work—that of the jobbing gardener—it must also be recognised that a thoroughly adequate staff is required, for the business side is exceedingly arduous in its demands. Speaking from a fairly wide personal experience a few years since, the present writer can say that where town work is concerned, it will prove most often a more satisfactory and certainly a more lucrative concern for a woman to devote all her energies to managing the actual gardens without keeping her own Nursery. She will, of course, *supply* all materials and plants, obtaining these directly from growers and contractors on wholesale trade terms. Such a business has been known to prove highly successful, and it certainly provides an interesting and varied existence for the right type of woman, although at the same time it is certainly one of considerable strain.

Advice on Market Gardening.—For the woman who wishes to run a market garden as distinct from a nursery garden and its kindred activities, great forethought is necessary. So variable indeed are the circumstances and conditions upon which success will depend, and so completely do they govern the situation, that an intending market gardener should take advice from one who knows the ropes before she risks her capital in this enterprise. But to the woman who makes the decision the following brief counsels are offered:—(1) Specialise, if only in one or two good things. (2) Aim at producing early vegetables and salad plants (*i.e.* "primeurs") on the French intensive system where possible. (3) Agitate for increasingly better conditions affecting the transport and marketing of stuff—at present a scandal to this country. (4) Supply direct to the consumer as much as you can, at all events until conditions improve.

Training of Students.—The owners of a nursery or a market garden may arrange to take pupils, provided that they can give the requisite time to do justice to their instruction, and that they are careful in the first place to admit only a serious (or sensible) type of woman student. During the war, one of the finest gardens in the country provided a splendid training ground for a number of women gardeners, following upon the introduction of one partially trained student who impressed the head-gardener favourably by her good and steady work; and the example had a wide effect for good from every point of view.

To those women gardeners who can join theory with practice, and add the gift of teaching to both, or who are able to furnish adequate premises and the necessary staff, the starting of a gardening school on sound practical lines will appeal as a work really worth doing—as indeed it is. Preparation will here be given for the usual examinations of the Royal Horticultural Society, and a sound foundation laid in theory and practice (more particularly the latter) for the National Diploma Examinations in Horticulture, and further still for the Degree in Horticulture under London University.

Horticultural Teaching.—Good posts are available for women gardeners as instructors in both public and private schools. The teaching thus given is, of course, entirely distinct from the training of professional gardeners as such. A Science degree or its equivalent is naturally desirable for this work, and in many cases essential; although it is actually true that more stress could often usefully be laid upon the practical side of the pupils' work and its essential relation to nature study and to other subjects of general education, rather than to emphasise a purely scientific interest in plant-life.

The action of the Ministry of Agriculture in organising, through its Horticultural Department, the services of lecturers, instructors, and superintendents throughout the country is one of the most hopeful signs towards developing a vast field hitherto largely untouched.

It may be interesting to mention that one of the highest authorities in the Horticultural Department of the Ministry, speaking unofficially to the writer early in the present year (1920), gave as his opinion that the appointment of women gardeners to posts such as those indicated above should not suffer the least prejudice on a question of sex.

There is no doubt that work of this type, both educationally and productively, opens up, under Goverment organisation, an immense field. Here again, it is practical experience, whether on the part of man or woman, which will count. The woman gardener who can demonstrate on a plot and not merely lecture on a platform, should command "equal pay for equal work" in the joint service she renders to education and food production on the small-holding and school garden ground.

In a former capacity as lecturer to teachers on school gardens under the London County Council, and as having a fairly wide experience through the holding of classes, organised publicly and privately, for allotment holders and teachers, the present writer can speak confidently of the extremely interesting character of, as well as need for, this work of horticultural education; and of its far-reaching results.

Conclusion.—To refer even distantly to the subject of education as a whole cannot fail in giving rise to ideas which it is beyond the scope of the present article to discuss. None the less, they are rooted in the need for a more constant recognition of Horticulture in its true position as an art, a science, and a craft; and to the consequent necessity for the best possible training of skilled gardeners who will also be fitted to organise, to inspect, and to teach.

We need such men and such women, experienced, thoughtful, and intelligent, whose balanced outlook and all-round knowledge will make them able to deal wisely with situations which present some of the most fascinating—if some of the most difficult—problems in the future of modern education and of modern life.—H. C.

WONDER BERRY (*Solanum nigrum*). See *SOLANUM.*

WOOD BARLEY (*Elymus europaeus*). See *ELYMUS.*

WOOD BETONY (*Stachys Betonica*). See *STACHYS.*

WOOD HYACINTH.—See *SCILLA.*

WOOD LAUREL (*Daphne Laureola*). See *SHRUBS.*

WOOD LEOPARD MOTH.—See *INSECT PESTS.*

WOOD LILY.—See *TRILLIUM.*

WOOD PRESERVATIVES.

Rose poles, trellis poles, pergola poles, etc., will not last long unless the wood is treated in some way before the poles are let into the ground. Charring is recommended by some authorities, but this is not very satisfactory, and by far the best way is to paint the portions of the poles to be buried, with hot tar or pitch.

Creosote.—As regards the wood which is above the ground, this, too, should be treated especially in districts where the rainfall is heavy, or where there are frequent falls of snow. Apart from the advertised proprietary wood preservatives we know of none better than ordinary creosote. Two or three liberal paintings of this will increase the life of such poles by very many years, and not injure the plants in the least. Poles should, of course, be allowed to become thoroughly dry before being exposed to the elements.

WOOD RUSH.—See *LUZULA.*

WOOD SAGE, or **WOODSAGE** (*Teucrium Scorodonia* and *Salvia sylvestris*).—See *POTHERBS, SALVIA,* and *TEUCRIUM.*

WOOD SANICLE.—See *SANICULA.*

WOOD SHAVINGS MANURE.—See *HORSE MANURE.*

WOOD SORREL.—See *OXALIS.*

WOOD SPURGE (*Euphorbia amygdaloides*).—See *EUPHORBIA.*

WOOD VETCH (*Vicia sylvatica*).—See *VICIA*.

WOOD VIOLET (*Viola sylvestris*).—See *VIOLA SPECIES*.

WOODBINE (*Lonicera Periclymenum*). See *CLIMBING AND TRAILING PLANTS*.

WOODLICE.—See *INSECT PESTS*

WOODRUFF. — See *MEDICINAL HERBS*.

WOODSAGE.—See reference under WOOD SAGE.

WOODSIA.—For the best species see *FERNS AND FERN GARDENING*.

WOODWARDIA.—For the best species see *FERNS AND FERN GARDENING*.

WOOLLEN RAGS.—See "Waste Hair" in our notes on ORGANIC PRODUCTS under NITROGENOUS MANURES in *MANURES*.

WOOLLY APHIS.—See *INSECT PESTS*.

WOOLLY BEARS.—See under TIGER MOTH in *INSECT PESTS*.

WOOLLY CLEMATIS (*Clematis lanuginosa*).—See *CLIMBING AND TRAILING PLANTS*.

WOOLLY KNOTWEED.—See *ERIOGONUM*.

WOOLLY WHITE LACTAR.—See HARMFUL FUNGI in *FUNGI : EDIBLE AND HARMFUL*.

WORM ERADICATORS.—See *WORMS*.

WORM GRASS (*Sedum album*).—See *SEDUM*.

WORMS.

Earthworms are the best friends of the gardener on account of the work they do in passing the soil through their bodies and mixing it with lime from their glands. They should thus be encouraged, and no attempt made to destroy them except when they are in pots or lawns.

Worm Eradicators.—In the cases ust cited worms are a nuisance and must be eradicated. This is not hard to do without injury to plants or grass. For pot plants the best method is to give a good soaking of lime water.[1] The worms come to the surface of the pots without delay and may be taken out into the garden.

On lawns a different method of procedure is advisable. A 40-gallon hogshead is filled with water, and into this is stirred about 3 oz. of commercial corrosive sublimate. A thorough soaking of the liquid (which is very poisonous) is given to the lawn, and the worms swept up into heaps as they come to the surface. They should either be buried deeply or burnt, since they will kill poultry if fed to them.

Injurious Worms.—Besides earthworms there are, as gardeners know, many other worms, as, for instance, EELWORMS, SLUGWORMS, and WIREWORMS. These are exceedingly injurious and must be destroyed, or banished from the garden. Their general appearance and the best modes of dealing with them are given in our article on *INSECT PESTS*.

WORMWOOD.—See *ARTEMISIA* and *MEDICINAL HERBS*, and under ARTEMISIA in *SHRUBS*.

WOUNDS ON TREES.—See *TREE WOUNDS*.

WOUNDWORT.—See *STACHYS*.

WULFENIA (Nat. Ord. Scrophulariaceæ).—This genus consists of only two species, both of which are shade-loving plants and thrive in damp sandy and peaty soil. They are propagated by division of the roots in autumn or spring.

Wulfenia amherstiana.—This bears tufts of evergreen leathery foliage. Flowers rich purplish-blue on slender spikes. Flowering Period, July. Height, 9 ins.

W. carinthiaca.—Similar to above but bearing smaller purple-blue flowers in denser spikes in July. Height, 9 ins.

WYCH ELM (*Ulmus montana*).—See *TREES*.

---

[1] This is made by stirring up fresh quicklime with cold water until no more will dissolve. The excess of lime is then allowed to settle, and the clear liquid used.—EDITOR.

X

XANTHISMA (Nat. Ord. Compositæ).—The summer flowering *Xanthisma texanum* (Syn. *X. Drummondii*) is a very free flowering annual, with yellow flower-heads, growing about 2 ft. high. Sown out of doors in April, so as to form a group, and thinned to 1–1½ ft. apart, it is attractive in the flower border, or in spaces between shrubs.

XANTHIUM (Clot Bur. Nat. Ord. Compositæ).—This is a genus of weedy hardy annuals the value of which in the garden is practically *nil.*

XANTHOCERAS.—For the best species see *Shrubs.*

XERANTHEMUM.—See *Everlasting Flowers.*

XEROPHYLLUM (Turkey's Beard. Nat. Ord. Liliaceæ).—Only one species of this genus (*X. asphodeloides*) is at all generally grown. This is a pretty hardy herbaceous perennial useful for a sunny perennial or mixed border, and bears white flowers in May, averaging 1½ ft. in height. It may be grown, propagated, and planted in the same way and at the same time as other hardy perennials (see article on *Perennials: General Culture of*), but requires a peaty soil, and a damp situation.

XIPHION.—Now included in the genus *Iris.*

XIPHOPTERIS.—Now included in the genus Polypodium, for which see *Ferns and Fern Gardening.*

XYLEBORUS.—See Orchid Borer in *Insect Pests.*

XYRIDION.—Now included in the genus *Iris.*

Y

YAMA GUMI (*Elaeagnus glabra*).—See *Shrubs.*

YAMS.

We do not recommend our readers to attempt the cultivation of these in this country.

YARROW. — See *Achillea* and *Medicinal Herbs.*

YELLOW ADDER'S TONGUE (*Erythronium americanum*).—See *Dog's Tooth Violets.*

YELLOW ARCHANGEL (*Lamium Galeobdolon*).—See *Lamium.*

YELLOW BARK OAK (*Quercus velutina*).—See *Trees.*

YELLOW BIRCH (*Betula lutea*).—See *Trees.*

YELLOW CENTAURY (*Chlora perfoliata*).—See *Chlora.*

YELLOW CHESTNUT OAK (*Quercus Muehlenbergii*).—See *Trees.*

YELLOW CYPRESS (*Cupressus nootkatensis*).—See *Trees.*

YELLOW FUMITORY (*Corydalis lutea*) See *Corydalis.*

YELLOW GENTIAN (*Gentiana lutea*). See *Gentiana.*

YELLOW HAW (*Crataegus flava*).—See *Trees.*

YELLOW HUNDREDWEIGHT. — A decorative Gourd. See *Ornamental Gourds.*

YELLOW LUPINE (*Lupinus arboreus luteus*).—See *Lupine.*

YELLOW OAK (*Quercus Muehlenbergii*).—See *Trees.*

YELLOW PIMPERNEL (*Lysimachia nemorum*).—See *Lysimachia.*

YELLOW PINE (*Pinus mitis*).—See *TREES*.

YELLOW SPANISH BROOM (*Spartium junceum*).—See *SHRUBS*.

YELLOW STAR OF BETHLEHEM (*Gagea lutea*. Nat. Ord. Liliaceæ).—Gardeners must keep this distinct in their minds from the *STAR OF BETHLEHEM* proper (*Ornithogalum*), on which a separate article appears. The Gageas are dwarf-growing hardy bulbs bearing greenish-yellow flowers in April, and growing about 6 ins. high.

YELLOW TURK'S CAP (*Lilium pyrenaicum*).—See *LILIES*.

YELLOW UNDERWING MOTH.—See under SURFACE LARVÆ in *INSECT PESTS*.

YELLOW WATER LILY (*Nuphar*. Nat. Ord. Nymphaeaceæ).—This is a hardy water lily of some merit available in several forms. It succeeds best where there is about a foot of water above it. Its general culture is the same as that outlined in our article on *WATER LILIES*, which see. We recommend the following species :—

Nuphar advena.—Yellow flowers throughout the summer.

N. luteum (BRANDY BOTTLE).—Yellow flowers with strong spirituous odour throughout the summer.

N. minimum. — Yellow flowers from June to July.

N. polysepalum.—Yellow flowers from June to September.

YELLOW WOOD (*Cladrastis tinctoria*).—See *TREES*.

YESSO FIR (*Picea ajanensis*).—See *TREES*.

YEW (*Taxus baccata*).—See *TREES*.

YORK AND LANCASTER ROSE (*Rosa damascena variegata*).—See *ROSE SPECIES*.

YOUTHWORT (*Drosera rotundifolia*). See *SUNDEW*.

YUCCA (Nat. Ord. Liliaceæ).

This is a genus of most useful evergreens for the rock garden or wild garden as well as for the general borders and for sub-tropical bedding. Most of them are of easy culture and hardy enough to stand an average English winter, though in ultra-cold districts some protection may be advisable. Any good, light, rich, sandy soil suits them admirably, and they may be successfully propagated by seeds, cuttings, and suckers in the usual way. For bedding purposes they should be raised in the same manner as half-hardy annuals or propagated by cuttings the previous season.

What to Grow.—All those mentioned below bear white flowers from July onwards to September. Owing to the popularity of the genus many synonymous species are now offered, but to add these would be waste of space and would confuse readers considerably. The following may be regarded as distinct: *Yucca angustifolia*, and its variety *stricta* (2–3 ft.); *Y. filamentosa*, and its varieties *flaccida* and *variegata* (SILK GRASS, averaging 1½–3 ft. in height); *Y. glauca* (2–3 ft.); *Y. gloriosa*, the well-known ADAM'S NEEDLE, and its varieties *Ellacombei* and *variegata* (4–6 ft.); *Y. orchioides* and its variety *major* (1–3 ft.); *Y. recurvifolia* and its variety *variegata* (3 ft.); and *Y. rupicola* (1½–3 ft.).

In addition to the above species the following half a dozen of the best hybrids should be grown if space admits: *Albella*, *arnottiana*, *Orion*, *sanderiana*, *Sirius*, and *Vomereuse*. All have white flowers.

YULAN (*Magnolia conspicua*).—See *CLIMBING AND TRAILING PLANTS* and *TREES*.

Z

ZAUSCHNERIA (CALIFORNIAN FUCHSIA. Nat. Ord. Onagraceæ).—There is only one species of this genus. It requires a warm, dry position in sandy loam fully exposed to the sun, and is propagated by division of the roots in spring.

Z. californica (HUMMING-BIRD'S TRUMPET).—This has branching stems and hoary leaves. Flowers brilliant vermilion. Site sunny. Soil sandy, well-drained loam. Flowering Period, August to September. Height, 1 ft. The variety *mexicana* has less hoary leaves. It produces vivid scarlet flowers earlier than the species, namely, in July.

ZEA (Nat. Ord. Gramineæ).

This is an unimportant genus of annuals the hardiness of which is doubtful. The best known species, grown at times in the borders but chiefly in the kitchen garden, is *Zea Mays*, popularly known by various names, such as GUINEA WHEAT, INDIAN CORN, INDIAN SUGAR CORN, MAIZE, MEALIES, SWEET CORN, and TURKEY WHEAT. Its culture is described in our article on *MAIZE, or INDIAN SUGAR CORN*.

ZELKOVA.—For the best species see *TREES*.

ZEPHYRANTHES (ATMASCO LILY. Nat. Ord. Amaryllidaceæ).—This is a very ornamental early summer flowering pot plant, requiring ordinary greenhouse treatment and of easy culture. It is propagated by offsets, and should be potted in sandy loam, peat, and leaf-mould. Temperature required, 40–50° F.

Greenhouse Species ;—*Zephyranthes Atamasco*.—Pure white. Flowers in May. Height, 1 ft.

Z. carinata.—Delicate rose. Flowers in May. Height, 1 ft.

Z. flava.—Pale golden-yellow. Flowers in May. Height, 1 ft.

ZEUZERA.—See WOOD LEOPARD MOTH in *INSECT PESTS*.

ZINC COMPOUNDS.

Very little is known of the horticultural value of the compounds of Zinc, though suggestions have been made to use such as Zinc Arsenide and Zinc Sulphate as fungicides. One point of importance to gardeners is that Zinc Sulphide is a white compound instead of a black one, as is Lead Sulphide. Thus when the greenhouses are syringed with Liver of Sulphur, no ugly blackening of paint results if Zinc is used instead of Lead when making the paint. We understand that Zinc Paint can be obtained without much difficulty, for after all it is only a matter of substituting Zinc Carbonate, or ZINC WHITE as it is popularly called, in place of Lead Carbonate. Zinc Paint should be universally adopted by gardeners, since Liver of Sulphur cannot be done without, and then there will be no more complaints of spoiling the appearance of the houses by spraying to check diseases.—E. T. E.

ZINNIA (Nat. Ord. Compositæ).

This is an interesting genus consisting chiefly of half-hardy annuals some of which are particularly handsome when in bloom, and very valuable in gardens when the autumn is fine and warm. All the kinds mentioned below should be treated as half-hardy annuals and raised in gentle heat in spring. They require liberal treatment at all times to develop their beauty to the fullest extent, but a warm and sunny position is equally essential from the time they are planted out in early June. They are very showy and give a wide range of harmonious colouring from almost white and fawn, through pink, yellow, and scarlet to crimson and purplish-red.

Zinnia elegans.—This is the most popular species of all both for border displays and as an exhibition flower. It is available in varied colour forms, flowers in the late summer and autumn, and averages 1½–2½ ft. in height.

Z. haageana.—This bears orange-yellow flowers from August to September, and grows 1½ ft. high.

Z. pauciflora.—This is a red, autumn-flowered species, about 2 ft. high.

Z. tenuiflora.—This seedsman's name probably indicates a variety of *Z. pauciflora.*—C. H. C.

ZIZIA.—Now included in the genus CARUM.

ZONAL GERANIUMS.—The same as ZONAL PELARGONIUMS.

ZONAL PELARGONIUMS. — See *PELARGONIUMS.*

ZONED PINK (*Dianthus callizonus*).—See *DIANTHUS.*

ZYGADENUS (Nat. Ord. Liliaceæ). This is a comparatively unknown but pretty genus of hardy herbaceous plants useful for the shady and moister parts of the herbaceous border. They will flower freely under these conditions if a little peat is added to the soil. They may be propagated by seeds sown in the usual way for hardy perennials, or by division of the rootstocks in November or March, at which times also they are most successfully planted. A large number of sorts have been described, but only five of them are grown. Four of these we briefly describe below :—

Zygadenus elegans (Syn. *Helonias glaberrima*).—A white sort blooming from May onwards, and growing 12 ins. high.

Z. glaberrimus.—A species producing creamy-white flowers about midsummer, and growing 12 ins. high.

Z. muscitoxicum (Syns. *Amianthimum muscitoxicum* and *Helonias laeta*).—This, popularly known as FLY POISON, bears white flowers in June, and averages 1½ ft. high.

Z. Nuttallii.—This also bears white flowers in June, and grows about 18 ins. high.

ZYGOCOLAX.—See *ORCHIDS.*

ZYGONISTA.—See *ORCHIDS.*

ZYGOPETALUM.—See *ORCHIDS.*

CALENDARS
FOR WORK THROUGHOUT THE YEAR

CALENDARS

FOR WORK THROUGHOUT THE YEAR

The pages which follow contain Calendars of work to be done in the various branches of the garden throughout the year. The writers, we may say, are all of them thoroughly practical men and well acquainted with their subjects, and it is hoped that this section of the Dictionary, which is included by special request, will be found extremely useful.

Very great effort has been made by each writer to make his Calendar as complete as possible, but since it is unlikely that any truly "complete" Calendar of Gardening ever has been or ever will be written, no apology is necessary for any omissions there may be.

The idea throughout has been to supply details of *When* to do the various things in the garden, and to leave the question of *How* to do them to the other contributors of the Dictionary. Calendars of this kind are extremely rare; on the other hand, the opposite kind are as abundant almost as are the new books on gardening which appear every year. Writers of such Calendars make a big mistake; they supply what is not wanted by the readers of any book or paper which has for the most part articles full of cultural details.

In the Calendars which follow explanatory cultural details have been carefully omitted, and the reader will not find many of them to worry him. We shall welcome suggestions for improving these Calendars.—THE EDITOR.

The Authors of the Calendars which are here combined are as follows :—

OUTDOOR FLOWER GARDEN AND PLEASURE GROUNDS	THE EDITOR.
THE GREENHOUSE	CHARLES COMFORT.
HARDY FRUIT GARDEN	J. G. WESTON.
INDOOR FRUIT AND VEGETABLES	D. LEWIS.
VEGETABLE GARDEN	F. R. CASTLE.

NOTE.—In these Calendars it is assumed that the reader will use his discretion about carrying out the instructions here contained. It is extremely foolish, for instance, to attempt to plant shrubs or make structural alterations during frost. See article on *WEATHER AND GARDENING.*

JANUARY.

OUTDOOR FLOWER GARDEN AND PLEASURE GROUNDS.

Trench all land intended for the making of new flower borders, whether for annuals, biennials, or perennials.

Lightly fork over the surface of existing perennial borders, working in some manure, if this was not done last November.

Lay turf for new lawns, after first levelling and rolling the ground.

Make new garden paths and renovate old ones. Frequent rolling of gravel or any loose surface paths is desirable.

Make any needful alterations in the flower garden, such as the formation of new borders, etc.

Plant shrubs of all kinds. Firm planting is essential for success.

Weed the surface of lawns if it has become bad. Brush the surface regularly to distribute worm casts, and roll at least once a week.

Plant hardy perennials of all kinds. Make them very firm.

Go over perennial borders planted in November and December, treading the soil firmly round the plants again after a thaw.

Re-set any edging stones which may be inclined to sink into the borders.

Make out the flower seed order and get it dispatched as early as possible. A penny or twopence spent on each variety of flower will give you ample seeds unless the garden is one of great size.

Protect herbaceous plants, such as Aquilegias and others which are not quite hardy, by putting mounds of cocoanut fibre or ashes over them.

Protect alpines, especially Androsaces and certain Sedums and Saxifrages possessed of hairy foliage by placing sheet glass over them.

Re-write or renew all weathered garden labels.

Make out the order for new herbaceous plants early in the month if you have not had time to do it before.

Make plans for new bedding or planting schemes in the garden. The long evenings in January are just the time for this work.

Trim grass verges of paths to give the pleasure grounds a neat and smart appearance.

Layer hardy shrubs provided the weather is exceedingly open.

Loosen the surface soil amongst bulbs to give them a chance of rapid growth.

Lay in a stock of turf, peat, leaf-mould and manure for further work, and especially for top-dressing the rock garden.

Refrain from mulching perennial borders and rose-beds until later on, or much good food will be wasted.

Prepare trenches for Sweet Peas without delay.

Prepare sites for Dahlias, Chrysanthemums, and other plants if showing is contemplated.

Dust Carnations and other choice plants in the special borders of the garden with lime or soot, remove dead leaves from them, also weeds and other rubbish.

Protect Auricula and Polyanthus plants in very severe weather.

Protect the less hardy shrubs in hard weather with mats, etc.

Plant hardy bulbs left over from the winter—the sooner the better.

Rake dead leaves and rubbish off the surface of shrubberies as early as possible.

THE GREENHOUSE.

Introduce batches of bulbs fortnightly from the "plunge" or cold frame.

Introduce a few pots of Doronicum and Solomon's Seal to furnish cut flowers.

Propagate Chrysanthemums for bush plants, selecting for cuttings shoots which have been well exposed to the light.

Give a top-dressing of rich soil to any Chrysanthemum plants which are backward in furnishing cuttings.

Cut over and remove Chrysanthemum plants when they have finished flowering and sufficient cuttings have been secured.

Shift Chrysanthemums intended for the production of big blooms into 3½-inch pots.

Give Herbaceous Calceolarias their final shift into 7-inch pots towards the end of the month.

Sow tuberous-rooted Begonias in shallow pans and place in heat.

Propagate the following edging plants by cuttings in heat: *Fuchsia Cloth of Gold*, *Fuchsia procumbens*, *Origanum Dictamnus*, and Tradescantias in variety.

Shift Hydrangeas intended for the production of single trusses into 5-inch pots, using a rich compost.

Re-pot ferns if pot-bound or if drainage be deranged.

Top-dress ferns requiring this attention.

Stand bulbs in a cold frame to ripen off, as they go out of flower, and gradually reduce the supply of water to them.

Prune and train climbing plants on wall or rafter.

Shift Pelargoniums into their flowering pots, ramming the soil rather firmly.

Give close attention to ventilation in cold weather with fitful periods of sunshine.

Damp down the fire during the day, unless the conditions be cold and sunless.

Drain and provide with suitable soil the site where any permanent climber or other specimen is to be planted.

Pot varieties of *Lilium auratum* and *L. speciosum*, and stand in a cold frame or in the coolest part of the house.

Order all necessary seeds, relying chiefly on well-tried varieties.

Make hanging baskets with wire netting, by means of a cutting-pliers.

Paint the inside of watering-cans as a preventive of corrosion by rust.

Remove promptly all spent blooms, dead foliage, and other decaying matter.

Prune specimen Fuchsias, and return to their former position.

Give Freesias liquid manure bi-weekly.

HARDY FRUIT GARDEN.

Proceed with planting operations of all kinds of fruit trees, especially on light well-drained soils.

Prepare cuttings of bush fruits, and insert during mild weather.

Carry out draining operations during the winter months. This is particularly necessary in heavy retentive soils for the choicer fruits, such as Nectarines, Peaches, dessert Plums, and Cherries.

Prepare stakes, labels, and soils for planting, in bad weather.

Renovate neglected orchard trees during the winter.

Grub out useless worn-out trees. Head back inferior varieties for future grafting, if stocks are healthy.

Prepare fruit tree washes for use in calm weather.

Spray fruit trees after pruning with a concentrated alkali wash, to remove mosses and lichens.

Continue root pruning in mild weather.

Examine fruit trees for American blight, and if found, dress thoroughly with an approved specific.

Protect Fig trees from severe frosts in cold districts, but do not leave them permanently covered.

Prune outdoor Vines this month, and afterwards paint with a sulphur mixture to prevent mildew.

Top-dress the vine-roots with a compost consisting of good loam, lime rubble, and crushed bones.

Plant out red, white, and black Currants on well-prepared ground.

Prune Raspberries and train on strained wires, or tie on strong stakes if preferred. Avoid crowding the canes in either case.

Shorten the stronger canes of Raspberries to about 5 ft. Clear the beds of all weeds and rubbish, afterwards digging between the rows.

Mulch raspberry beds with a good dressing of farmyard manure, late in the month.

Stake and securely tie all newly planted fruit trees.

Examine labels on fruit trees, and replace with new ones if necessary.

Prune yearling Black Currant bushes to within a bud or two of the ground, thus ensuring strong fruiting wood for another season.

Continue all pruning operations in suitable weather.

Burn all prunings, rubbish, and perennial weeds in a slow fire. Mix the ashes with some new soil and manure, and return to the ground as a top-dressing.

Use lime-rubble freely when planting any stone fruits.

Examine bush fruit cuttings regularly, and re-firm all loosened by frost.

Wheel out manure to the fruit quarters during frosty weather.

Treat fruit trees and bushes bearing regular crops generously with manure.

Trench ground for new raspberry beds, digging in plenty of farmyard manure, and some crushed bones and lime as the work proceeds.

Clean all rubbish from strawberry beds, and lightly fork between the rows.

Examine all old stakes to fruit trees, replacing any decayed at the base.

INDOOR FRUIT AND VEGETABLES.

Water permanent Fig tree borders. Close the house and maintain a night temperature of 50° F. Open ventilators a little on sunny days: closing early after syringing and damping down.

Sow seeds of Melons singly in 3-inch pots for the first crop.

Start early Peach trees in the usual way. Syringe the trees.

Bring the first batch of Strawberry plants into the greenhouse.

Maintain temperature of 55° F. for Vines started in December, and cease syringing when well on the move. Water the border.

Cleanse late Vines and top-dress the borders.

Make up hotbeds of leaves and manure for forcing early vegetables.

Plant Asparagus roots on hotbeds, or in heated frames, for an early supply of grass.

Sow Dwarf Beans for early work in house or pit where a temperature of 60° F. can be maintained. Pot up December sown plants.

Sow Cucumbers for early work.

Sow Lettuce seed in a warm house, pricking out in due course and growing on rapidly.

Sow Mustard and Cress in boxes under the stage of a warm house, transferring to near the glass as soon as germinated.

Lift a few roots of Mint and Tarragon to force in mild heat for early cutting.

Start forcing Potatoes in early fruit houses.

Sow seeds of early Dwarf Peas in 9-inch pots, placing in a warm greenhouse.

Plant a few Seakale crowns weekly to maintain supply.

Sow Tomato seeds in a temperature of 65° F. Put autumn sown plants into 5-inch pots, placing them near the glass in a warm house.

Keep hotbed and Lettuce frames matted nightly until danger of frost has passed.

VEGETABLE GARDEN.

Sow Mazagan, or if preferred, one of the white-seeded Broad Beans on a warm border.

Select seed tubers of early varieties of Potatoes, setting these eyes upward in shallow boxes in a light frost-proof shed.

Get all ground operations completed as early in the month as possible.

Use soil fumigants for pest-ridden soils.

Sow round seeded sorts of Peas on dry soils.

Sow seed of exhibition Onions now in a warm greenhouse if extra fine bulbs are wanted.

Sow seed of Cabbage or Cos Lettuce in pans or boxes, to give hearts from a warm outside border, early in May.

Sow Radishes in a warm border, always selecting a rich bed, and in the event of extra sharp frosts give the bed a covering of straw or hay.

Lift strong clumps of Rhubarb for forcing, to succeed the clumps put into heat earlier in the winter.

Prepare hotbeds for forcing Asparagus, or Carrots of the shorthorn type, using a light soil for the carrots.

Sow seeds of early Cauliflowers in a heated greenhouse.

Sow Cucumbers for an early crop in single pots.

Sow Tomato seed early in the month.

Look frequently over Lettuce or Endive in cold frames, removing every decaying leaf, and giving air when conditions are favourable.

Protect rows of Celery growing in exposed situations. Dry straw or bracken is best for this purpose.

FEBRUARY.

OUTDOOR FLOWER GARDEN AND PLEASURE GROUNDS.

Push forward all kinds of structural alterations, amendments, and additions to the garden.

Build new rock gardens, wall gardens, etc.

Make Japanese Gardens, Water Gardens, etc., as advised in the special articles on these subjects.

Plant hardy perennials of the following and many other sorts: Achillea, Anchusa, Anemone, Aquilegia, Aster (Hardy), Campanula, Centranthus, *Chrysanthemum maximum* and *C. uliginosum*, Delphinium, Digitalis, Doronicum, Erigeron, Galega, Geum, Helenium, Helianthus, Inula, Lupinus, Lychnis, Paeony, Papaver, Pentstemon, Phlox (Hardy), Polemonium, Pyrethrum, Ranunculus, Rudbeckia, Solidago, Trollius, Verbascum, and Veronica.

Plant all perennials very firmly, in borders which have been prepared well in advance.

Plant Roses of the following and many other sorts:—

Climbers.—Alister Gray, Bouquet d'Or, Gloire de Dijon, Climbing Caroline Testout, Gruss an Teplitz, Climbing Kaiserin Victoria, Climbing Lady Ashtown, Maréchal Niel, Climbing Mrs Grant, Madame Berard, W. A. Richardson, Reve d'Or, American Pillar, Philadelphia Rambler, Crimson Rambler, Blush Rambler, Alberic Barbier, Dorothy Perkins, Hiawatha, Excelsa, Minnehaha, etc.

Dwarfs, etc.—Captain Hayward, Avoca, Bessie Brown, Earl of Dufferin, Lady Roberts, Hugh Dickson, Mrs Sharman Crawford, Countess of Gosford, Dean Hole, Lady Ashtown, Mildred Grant, Killarney, La Tosca, Madame Ravary, Lady Pirrie, Mrs Alfred Tate, William Sheen, Richmond, Pharisaer, Viscountess Folkestone, Mrs Myles Kennedy, Prince Arthur, Ulrich Brunner, Ben Cant, Harry Kirk, etc.

Continue laying lawns if this work was not completed last month.

Prune hardy shrubs.

Thin growths on climbing Roses.

Erect new arches, arbours, pergolas, etc.

Fork over shrubberies, working in a little manure.

Overhaul the rock garden. See to its plants and its labels, renewing any of either which are done for.

Go over the winter bedding and make any plants which have been loosened by recent frosts firm again.

Re-firm any newly planted stock of any kind, whether it be shrubs or perennials, after frost.

Roll lawns and paths regularly at least once each week.

Prick over the surface of existing borders should this get caked after rain and sun.

Lift and divide any perennial plants which have grown too thickly.

Remove weak dying wood from climbing Roses in mild weather.

Inspect rock plants and see that the protection afforded is sufficient. February rains and fogs often do more damage than February frosts.

Plant any remaining spring flowering bulbs without delay, or the bloom they give will be very late. All the commoner ones in addition to Fritillaries, Scillas, Anemones, Ranunculuses, Ixias, Aconites, etc., may be planted this month.

Protect early flowering Irises.

Plant hardy shrubs.

Complete all trenching of flower garden land by the end of the month.

Plant bulbs after forcing, in the wild garden.

Dress vacant flower borders with naphthalene or other fumigating material to destroy soil pests.

Paint labels in readiness for further planting next month. Write them while they are still wet.

Complete as early as possible any work in the flower garden which has had to be held over from January.

THE GREENHOUSE.

Stake Daffodils and Hyacinths before there is danger of the flower stems getting damaged.

Introduce more bulbs from the "plunge" or cold frame, and see that they are well supplied with water.

Sow seeds in moderate heat of *Asparagus Sprengeri*, *Cordyline indivisa*, *Eucalyptus citriodora*, and *Grevillea robusta*.

Break up old plants of *Francoa ramosa* and pot up the pieces furnished with aerial roots, into 4-inch pots.

Pot off autumn-struck cuttings of *Crassula* (*Kalosanthes*) *coccinea* into 3-inch pots, using a sandy loam compost with some charcoal in it.

Propagate Perpetual Flowering Carnations, inserting the cuttings in sandy soil in a heated structure.

Cut over plants of *Salvia splendens*, to induce them to break and furnish a supply of cuttings.

Give weekly applications of liquid manure to Mignonette in pots.

Shift into 6-inch pots autumn-sown Sweet Peas to be flowered indoors.

Introduce *Azalea mollis*, *Dielytra spectabilis*, Lilacs, and other shrubs intended for flowering indoors.

Re-pot, towards the end of the month, established plants of *Agapanthus umbellatus*; *Crassula coccinea*; *Hydrangea hortensis* and its varieties; *Sparmannia africana*; and *Trachelium coeruleum*.

Remove all decayed parts, trim and top-dress Selaginellas, or other plants growing alongside the pathways.

Remove a little of the surface soil in borders where climbing plants are growing, and give a top-dressing of fresh soil suitable for the different subjects.

Pot off rooted cuttings of Chrysanthemums intended for bush plants, placing two plants in each pot.

Stake and tie Mignonette in pots, using quite short slender stakes.

See that there is a sufficient stock of labels and stakes in hand.

Continue to look over the plants for water in the morning, taking care not to spill water about the house.

Remove any moss or weeds from the surface of the pots, and wash any dirty pots.

Keep a sharp look-out for aphis, and on its first appearance vaporise or fumigate, but if only a few isolated plants are attacked, apply a little tobacco powder with a " puff."

Increase the ventilation as the month advances, but avoid cold draughts.

Apply liquid manure to Cinerarias and Primulas twice a week.

Remove bulbs as they go out of bloom, and rearrange the occupants of the house from time to time.

HARDY FRUIT GARDEN.

Trench ground for new strawberry beds, working in plenty of well-rotted manure.

Plant wall fruit trees in favourable weather.

Postpone planting of fruit trees during wet weather, or when the ground is sticky.

Mulch newly planted fruit trees with light material only; heavy yard manure keeps the soil cold.

Prune and train Apricots on walls.

Thin the spurs on old Pear and Plum trees, cutting back to a healthy bud at the base.

Fork over fruit-tree borders lightly, after pruning and training is completed.

Prune Cobnuts and Filberts this month; keep the centres of dwarf nut-bushes quite open, and restrict the number of main stems.

Clear off all suckers springing from the base of Cobnuts and Filberts, and give a dressing of lime, forking into the surface.

Give a good dressing of manure to nut-trees that have borne heavy crops.

Watch Apricots, and early Peaches on warm walls, and prepare blinds for protecting the blooms against frost.

Avoid heavy permanent coverings for the hardy fruits: a double thickness of fish netting is usually a simple and effective protection.

Avoid putting on protective material before the blooms commence to open. If thick blinds are used they must be removed in the day-time.

Root-prune unfruitful Fig trees and restrict their root-run.

Postpone transplanting or root-pruning fruit trees on heavy soils during wet weather.

Complete all spraying operations before the buds commence to burst.

Fill up blanks in the raspberry beds.

Look over fruit nets in bad weather, repairing all damaged ones for future use.

Top-dress peach and nectarine borders with a mixture of new loam, lime rubble, bonemeal, and wood ashes, treading or ramming it very firm.

Prune and train Morello Cherries, discarding any old fruiting wood, and giving the young shoots plenty of room.

Scrub the bark of any old fruit trees infested with scale insects with a reliable insecticide, to ensure a thoroughly clean start for the season.

Train the shoots of Loganberries and American Blackberries very thinly if on a trellis, and give the roots a heavy dressing of manure.

Net Gooseberries and Red Currants against bullfinches and tits, or use black thread liberally through the branches.

Cut down to within a few inches of the ground late-planted Raspberry canes, to ensure strong canes for future fruiting.

Plant autumn fruiting Raspberries in an open sunny position.

INDOOR FRUIT AND VEGETABLES.

Disbud early Fig trees in pots to avoid overcrowding, stopping the shoots retained at the fourth joint.

Prepare and plant early beds for Melons.

Ventilate freely all hardy fruit houses, fumigating when growth commences. Afford a little fire-heat when the trees are in bloom and maintain a buoyant atmosphere. Pollinate the blooms on sunny days.

Give a little top air daily to Peach trees in bloom, and increase the temperature 5°. Distribute the pollen by tapping the trellis work about noon daily.

Gradually increase the temperature for early Strawberry plants and syringe daily, starting further plants for succession.

Rub off the weak shoots on early Vines, retaining only one growth to each spur, tying down with care. Pinch out the tips of the shoots at the second leaf beyond the bunch.

Plant more Asparagus roots for succession, admitting a little air daily as growth proceeds.

Sow Dwarf Beans at intervals of three weeks, syringing daily plants in active growth.

Plant a few Chicory roots in a warm house and keep quite dark.

Sow Early Shorthorn Carrots on a hotbed, and thin out to 3 ins. apart.

Plant out Cucumber plants on hillocks 3–4 ft. apart.

Apply salt and water, or weak stable manure water to Mushroom beds showing signs of exhaustion.

Plant Potatoes on hotbeds, and keep those growing in pots near the glass, admitting air whenever possible.

Sow Radish seed very thinly on hotbeds.

Pot Tomato seedlings in 3-inch pots,

giving a little air on sunny days. Repot autumn sown plants to 10-inch pots.

Sow Early Forcing Turnips on hotbeds, thinning out the seedlings to 6 ins. apart.

Sow Vegetable Marrow seeds in heat of 65° F., for early cropping in frames.

VEGETABLE GARDEN.

Prick out Tomatoes from seed sown last month, using a nice sandy compost. When the roots have taken well hold of the new soil, give ventilation, but avoid draughts.

Lift the crop of Jerusalem Artichokes if not already done and store the tubers in dry quarters, or in a heap under the shelter of a wall, covering with a few inches of soil.

Sow a little more Cauliflower seed in a heated greenhouse this month to give heads outside in June.

Force strong clumps of Rhubarb growing in the garden by covering with a good depth of fermenting material.

Fill any gaps which frost or insects may have caused in the cabbage bed. Give well-established runs a good dressing of old soot or a light sprinkle of nitrate of soda.

Sow Cabbage seed in heat for a succession.

Sow further supplies of Carrots, either in a cold frame or in a gentle hotbed. Thin those sown last month and give air on all suitable occasions.

Sow maincrop Parsnips, protecting the young plants from slugs.

Plant a few rows of early potatoes at the end of the month where the soil is exceptionally light, and warm borders can be spared to the crop.

Prepare the bed intended for Onions, using manure freely. Leave the surface of the bed in a rough state.

Thin out autumn-sown Onions where these are crowded, transplanting the surplus to other quarters where manure has been freely used.

Earth up rows of early-sown Peas or Beans as soon as the plants push through the soil.

Make further sowings of Peas and Beans selecting a warm position.

Make the first sowing of Spinach in a warm border when land is dry enough. Either the prickly or round-seeded variety is suitable.

Lightly fork over the surface of established asparagus beds afterwards applying a good coating of rich manure.

Prepare ground for new asparagus beds.

Get all ground operations finished by the end of the month in preparation for next month's busy time.

MARCH.

OUTDOOR FLOWER GARDEN AND PLEASURE GROUNDS.

Complete the digging over of vacant borders as early as possible.

Rake down and break the surface soil of borders in readiness for sowing seeds.

Sow seeds out of doors of any of the following among many other hardy annuals: Acroclinium, Asperula, Calendula, Candytuft (*Iberis*), Clarkia, *Convolvulus minor*, Eschscholzia, Eutoca, Gaura, Godetia, Jacobaea (*Senecio*), Leptosiphon, Lupinus, Malope, Mignonette, Nemophila, Nigella, Phacelia, Saponaria, Shirley Poppies, Silene, Sunflowers, Sweet Sultan, and Virginian Stock.

Sow Sweet Peas very thinly in the prepared trenches. Plant out what were sown indoors last month towards the end of this month.

Complete the planting of most hardy perennial plants by the middle of the month, or late flowers of poor quality will result.

Thin out autumn-sown annuals and hoe the ground between them. Weed them thoroughly.

Push forward the work without delay, if rose-beds and perennial borders have not yet been lightly turned over and manure worked in. Do the work with great care so as not to injure the roots.

Complete any garden alterations not yet accomplished without delay, for delays are dangerous.

Complete the planting of hardy shrubs and Roses if the weather last month did not admit of this being done.

Finish the winter pruning of hardy shrubs and climbers, and commence the pruning of Rose trees towards the end of the month.

Plant out Carnations which have been wintered in frames, surrounding them by rings of lime or soot.

Slightly loosen the soil around choice bulbs which are now appearing in the borders.

Continue planting bulbs which have been forced, out into the wild garden.

Commence mowing the lawn towards the end of the month.

Commence tying up perennial plants (Doronicums, etc.) towards the end of the month. These plants will be flowering early in April.

Prepare sites for early flowering border Chrysanthemums and Dahlias, if this has not already been done.

Top-dress the rock garden with a mixture of light, sandy loam, leaf-soil, and old manure, making the new soil very firm.

Go over the whole of the contents of the rock garden at the end of the month, removing protection. Remove at the same time any dead leaves or shoots. Renew labels.

Tie up newly planted shrubs and mulch them with peat or manure.

Complete the tidying up of existing shrubberies without a moment's delay.

Top-dress Azaleas and Rhododendrons with a mixture of equal parts old hotbed manure, oak leaf-mould, and turfy loam, to encourage them to do their best in flowering.

Sow Anemones in small drills for future use.

Plant hardy Gladiolus.

Plant hardy Lilies.

Sow Stocks out of doors in a warm bed.

Dress rose-beds with Tonk's formula, rotted dung, or sewage.

Protect all young perennials, especially Delphiniums and Pyrethrums, from slugs by rings of soot or lime.

Complete as early as possible all work held over from last month.

THE GREENHOUSE.

Shift *Clarkia elegans* and *Schizanthus Wisetonensis* into their flowering pots, those of 7-inch diameter being generally suitable.

Make sowings of *Kochia trichophylla* and *Zea japonica Four-Coloured Perfection*, in gentle heat.

Propagate *Libonia floribunda*, *L. Penrhosiensis*, *Sparmannia africana*, and *Trachelium coeruleum* by cuttings.

Give young plants of Malmaison Carnations their final shift into 6-inch pots.

Re-pot Malmaison Carnations retained for a second year.

Pot off rooted cuttings of Perpetual Flowering Carnations into thumb pots.

Pot off autumn-sown Cyclamens into 3-inch pots, taking great care not to injure the brittle, fleshy roots.

Give Clarkias and Schizanthuses a final pinching towards the end of the month.

Propagate by cuttings Zonal Geraniums for winter flowering.

Shake out and re-pot Zonal Geraniums to be retained for a second year.

Divide Cannas with a sharp knife and start into growth in shallow boxes, among leaf-mould, in moderate heat.

Sow the following Primulas in gentle heat: *P. malacoides*, *P. obconica*, and *P. sinensis*.

Divide and re-pot *Primula Kewensis*.

Start Crinums into growth by standing them in full light and applying water in increasing measure as growth proceeds.

Shift on Crinums if necessary, bearing in mind that they succeed best when somewhat confined at the root.

Give *Vallota purpurea* rather more liberal supplies of water now, and when growth becomes active give occasional doses of weak liquid manure.

Dust Roses affected with mildew with flour of sulphur, or spray with potassium sulphide.

Start tuberous-rooted Begonias in gentle heat, by arranging them in a tray on which some flaky leaf-mould has been placed.

Shift Sweet Peas into their flowering pots, and supply them with dwarf twiggy stakes to support them till placed in their permanent positions.

Give occasional applications of liquid manure to Deutzias, Richardias, and Roses.

Keep a sharp look-out for frost, and if it occurs increase the fire-heat as necessary.

HARDY FRUIT GARDEN.

Mulch fruit trees which bear regular crops heavily, especially on light shallow soils.

Cut autumn fruiting Raspberry canes down to ground-level, as the fruits are produced on the current year's growth.

Mulch all newly planted fruit trees before drying March winds are experienced.

Plant Strawberries from pots wintered in cold frames, or from nursery beds.

Protect the various wall fruit trees as they commence to blossom.

Complete all arrears of pruning

immediately, as the sap will now be on the move.

Prune any Gooseberries which were left till late to avert damage by birds.

Prune Gooseberries severely now if extra large dessert fruits are wanted.

Fork the soil up lightly under fruit bushes, following this up with a mulching of half-decayed manure.

Sow seeds of Alpine Strawberries in pans or boxes, and place same in a temperature of about 50–60° F., to germinate. Keep them moist.

Dispense with winter coverings for Figs. Train and prune the trees.

Complete all arrears of fruit planting, and do not let the roots get dry by long exposure to the air.

Spray Pear trees with a suitable insecticide for the pear fly, just before the blossom opens.

Paint Apple trees infested with American blight with pure paraffin.

Examine Black Currants for big bud. If attack is slight, hand pick and burn. Burn badly infested bushes.

Tread the soil round bush fruit cuttings if loosened by frost, to make them quite firm in the ground.

Remove all sucker growths from the roots of Nectarine, Peach, and Plum trees.

Top-dress any exhausted Peach trees with rich soil and manure, using bone-meal, charcoal, and lime rubble, with a good proportion of new loam.

Spray Nectarine and Peach trees before growth commences, to prevent leaf-curl.

Continue planting Loganberries and other brambles, but mulch immediately as a protection against drying winds.

Cut down to ground-level all extra late-planted Raspberries and Loganberries.

Prune maiden Nectarine and Peach trees to from four to six buds, weak shoots to three buds.

Cut back maiden Plum trees to six buds, in order to make a good foundation for the future tree.

Shorten the growths on maiden Apricots to four buds.

Complete the pruning of Fig trees, and train all growths very thinly.

INDOOR FRUIT AND VEGETABLES.

Spray Fig trees with soap and liver of sulphur solution to prevent red spider. Attend to the thinning and pinching of the shoots.

Pinch out the points of all lateral growth of Melons at the second leaf, and syringe the plants two or three times a day. Sow seeds for general crop.

See February Calendar for remarks on hardy fruit trees in pots. These apply for present month.

Disbud early Peach trees and tie the shoots neatly on the trellis. Thin out Peach fruits on the trees, leaving two per square foot. Fumigate the early Peach house to ward off attacks of fly and aphis, maintaining a buoyant atmosphere in the late Peach house when the trees are in bloom.

Thin Strawberry fruits to seven on a plant and increase the temperature as the fruits are swelling. Give the plants weak liquid manure two or three times a week, admitting plenty of air to maintain a buoyant atmosphere as the fruit ripens and cease syringing.

Bring more Strawberry plants into the house for a succession.

Start the late vinery, and guard against too high a temperature until growth is active. Increase the temperature by 5°, and admit a little air daily for Vines in bloom. Water the borders.

Thin early Grapes while the berries are small.

Thin bunches of Grapes to one on each shoot.

Give liquid manure to Dwarf Beans twice a week after the pods are set.

Syringe Cucumbers freely and maintain a warm, damp atmosphere.

Plant Lettuce in frames and keep fairly close until growth is active.

Make up a late Mushroom bed.

Hoe up Potatoes in frames, giving air on all favourable occasions.

Grow on Peas in pots in a very light house and afford them plenty of air.

Sow Radishes in a cold frame for succession.

Plant a few Seakale crowns weekly in an unheated dark shed for late supplies.

Plant out maincrop Tomatoes, and pinch out side growths as they appear. Sow seeds for May planting in deep frames and cold greenhouses.

Put Vegetable Marrow plants into 5-inch pots, and keep them growing in a warm house near the glass.

VEGETABLE GARDEN.

Remove all weeds from asparagus beds and give a light dressing of salt. Make up new beds in readiness for planting early next month.

Complete the planting of Jerusalem Artichokes.

Plant out Broad Beans, which have been raised in heat early in the year, into the open. Sow again for succession.

Divide Chives, replanting them in well-manured soil.

Sow any of the shorthorn varieties of Carrots in a sheltered border early in the month.

Sow maincrop Leeks out of doors. Harden off Leeks sown in January in heat.

Keep seedlings of large growing varieties of Onions (sown early in the year) near the glass, and give air freely.

Plant Potato Onions, as early in the month as possible; also Onion Sets, or large bulbs for seed.

Plant Shallots if not already done.

Sow any of the most hardy varieties of Peas early, delaying the marrowfats until after the middle of the month.

Make a small very thin sowing of Turnips in a warm border, giving these a well-manured soil.

Plant earliest varieties of Potatoes, burying the sets at least 6 ins.

Sow French Breakfast, or one of the turnip-rooted varieties of Radishes.

Sow Spinach Beet and Kohl Rabi out of doors.

Sow Couve Trouchuda in a frame early in the month.

Sow Marrowfat Peas after 15th March, whenever the state of the soil allows this to be done without being sticky.

Plant out Peas sown in boxes or pots early in the year, protecting these with dwarf bushy sticks.

Sow Broad Beans any time this month.

Force Seakale outside.

Make new beds of Seakale this month.

Sow the maincrop of spring Onions as early in the month as the state of the soil allows.

Use the hoe freely among all growing crops.

Plant Jerusalem Artichokes early in the month.

Continue to plant out Cabbages, making the soil about the roots very firm.

Prick out Celery sown in boxes last month.

Sow Broccoli outside for early autumn use.

Sow Cauliflower and any of the small hearting varieties of Cabbage.

Make small sowings of Leeks, Lettuce, and Savoy Cabbage.

APRIL.

OUTDOOR FLOWER GARDEN AND PLEASURE GROUNDS.

Sow seeds of any and all the annuals named last month in good finely raked soil, either in clumps, irregular patches, or lines.

Sow any of the following hardy annuals in little pockets in the rock garden: Alyssum (Sweet), *Asperula azurea*, *Kaulfussia amelloides*, *Leptosiphon densiflorus Limnanthes Douglasii*, Meconopsis, *Nemophila insignis*, *Omphalodes linifolia*, *Silene pendula compacta*.

Commence hoeing the perennial border. Care is needed early in the month not to injure young shoots of plants.

Hand-weed lawns to remove plantains, dandelions, etc. Apply lawn sand.

Clip Ivy climbing on the house, garden walls, banks, or tree stumps in the wild garden, choosing a calm day for the work.

Rake over shrubberies and herbaceous borders after well hoeing them to impart a neat appearance, and to remove surplus stones.

Plant out Sweet Peas sown indoors last month.

Plant out Calceolarias and Pentstemons with an edging of *Alyssum maritimum*.

Plant out Violas of all kinds which have been wintered in frames, as early this month as possible.

Plant out Pansies in rich soil.

Give plenty of water to perennials planted last month if the weather is dry, to enable them to establish themselves in their new quarters.

Prick off hardy annual flowers sown last month in reserve beds.

Thin out all hardy annuals as soon as they are large enough to handle conveniently.

Complete the work of planting alpines in the rock and moraine garden as early in the month as possible, and do not let them lack water.

Complete the pruning of Roses this month.

Mulch Roses with manure this month. The mulching is of special importance in the case of newly planted trees.

Gather flowers regularly from the

herbaceous border. If the plants are not allowed to produce seed and ripen it, their flowering periods will be considerably extended.

Continue the routine work of staking and tying up, also the protecting of choice plants from garden enemies, which was commenced last month.

Plant out Border Chrysanthemums in firm, rich soil.

Trim up both plant and grass edgings to give the garden a neat, smart appearance.

Remove dead flowers from rock plants as fast as they go out of bloom.

Prune rampant growing rock plants such as Arabis, Aubrietia, Cerastium, Vinca, etc., if they are inclined to overrun their quarters.

Sow more Sweet Peas about the end of the month to give ultra-late blooms.

Sow more hardy annuals during the final week of April for succession.

Plant out Spiraeas from the greenhouse, also Ericas, etc. etc. Those required again for indoor work may simply be plunged. Thus they need much less care and water.

Plant out perennials and biennials raised in heat.

Complete the renovation of paths, drives, etc., to give the garden a neat appearance.

Feed Polyanthuses and Auriculas with dilute liquid manure.

Plant out Hollyhocks.

Fill up gaps in mixed borders caused by late frosts, with young annuals, biennials, and perennials from reserve beds.

Commence propagating various perennial plants by removing small basal growths now being freely produced. Insert these in sandy soil in a shady site, preferably covering them with a frame or hand-light.

Cut bulbous flowers now open in the pleasure and wild garden freely, and, above all, prevent them from ripening seed, or they will be much weakened.

Loosen the land in which Ranunculuses are planted, and later in the month assist them in their growth with liquid manure.

Sow Herbs for the herbal section of the flower garden.

Clip dead flowers off Pansies and Violas regularly once or twice a week. If this is continued throughout the summer they will continue blooming until October.

Protect choice Daffodils, Tulips, etc., which are going to be exhibited, from rain and wind, otherwise they will be spoilt.

Sow Carnation seed for next season.

Sow seeds of sweet-scented flowers in a special section of the pleasure garden. They may be associated with herbs.

Make or complete plans for summer bedding in readiness for next month. See articles on *COLOUR GARDENING*, *BEDDING OUT*, etc. etc.

Follow up and complete as early as possible any work in the flower garden described under March if, owing to circumstances, it was not finished in that month.

THE GREENHOUSE.

Shift late struck Perpetual Flowering Carnations of the previous year into 6- or 7-inch pots according to their vigour.

Shift on Camellias requiring more room at the root before active growth commences.

Give weekly applications of liquid manure to Camellias making young growth, excepting those which have been re-potted recently.

Propagate Abutilons, Cytisuses, *Diosma ericoides*, and Epacrises by cuttings.

Re-pot or top-dress Epacrises as necessary before they start into active growth.

Pot up Cannas into 5-inch pots as they start into active growth.

Pot off into small pots cuttings of various plants as they become rooted.

Stake and tie Clarkias and Schizanthuses, using slender stakes.

Shift bush Chrysanthemums into 5-inch pots, and transfer to a cold frame.

Pinch bush Chrysanthemums when they attain a height of 4 ins.

Re-pot *Clivia miniatum* and its varieties. If it is desired to increase the stock, break up the clumps and pot up the bulbs singly.

Pot up tuberous-rooted Begonias as growth becomes active.

Re-pot Ivy-leaved Geraniums, after which stake and tie the plants.

Pot off *Grevillea robusta* and other seedlings sown during the previous two months.

Shift on Bamboos if necessary; if not remove a little of the surface soil and top-dress with a rich compost.

Re-pot *Bambusa Fortunei* var.,

Eulalia japonica var., *Eulalia Zebrina*, and *Isolepis gracilis*.

Re-pot established plants of Abutilons, *Aloysia citriodora* (Lemon-scented Verbena), and Eupatoriums.

Discontinue the application of fire-heat, except when frost occurs.

Damp the pathways in the mornings on sunny days.

Increase the ventilation as the month proceeds, but still guard against cold draughts.

Keep aphis in check by means of vaporising or fumigating.

Shift Perpetual Flowering Carnations now in thumb pots, into those 3 ins. in diameter.

Apply moderate shading as necessary from the middle of the month onwards.

Take seed of any extra good Cinerarias.

Secure seed of the various Primulas, if available.

Pinch growing Fuchsias, but allow at least ten days between the operations of potting and pinching.

HARDY FRUIT GARDEN.

Complete the pruning of all fruit trees on north walls.

Mulch late-planted fruit trees of all kinds, to keep the soil moist.

Examine Gooseberries for caterpillar, and hand-pick or spray according to circumstances.

Clean up strawberry beds, forking in a liberal dressing of artificial manure and soot, and finish off with a mulch of well-rotted manure.

Disbud Apricots on south walls on warm days, but postpone the operation if cold weather prevails.

Examine fruit borders under glass copings and walls regularly for moisture. If found necessary heavy soakings should be given, driblets are useless.

Train Blackberries on a fence or wall in sunny position.

Hoe strawberry beds frequently to keep them clear of seedling weeds.

Spray Black Currants with a mixture of soft soap and quassia if big bud develops.

Disbud Peaches and Nectarines, commencing at the top of the tree, and continuing at intervals of five or six days.

Graft Apples, Cherries, Pears, and Plums, as soon as the sap is running.

Fork lightly over stiff soils, round newly planted fruit trees in dry weather, to prevent soil from cracking. Replace light mulching afterwards.

Syringe transplanted trees showing signs of distress every warm afternoon.

Spray Apricot trees occasionally with quassia extract, to keep them clear of insects.

Syringe Plum trees on walls regularly after the fruit is set.

Watch for red spider on Peaches, and take preventive measures early.

Soak the plum border well when the crop on wall trees is set.

Give liquid manure water or artificial fertilisers to all fruit trees carrying heavy crops, and water it well in.

Disbud outdoor Vines when the shoots are about an inch long.

Finish all grafting without delay.

Plant hardy Vines from pots, spreading out the roots carefully, before covering with soil. Make the soil quite firm, and apply a light mulch at once.

INDOOR FRUIT AND VEGETABLES.

Syringe Fig trees twice daily and increase the temperature as the fruits are swelling, seeing that the borders do not suffer for lack of water.

Pinch out the points of Melon shoots at one leaf beyond the fruit.

Pollinate female Melon blooms when three or more are out at once and maintain a drier atmosphere while the fruits are setting.

Fumigate orchard house fruit trees that have set their bloom, and syringe the trees twice daily.

Maintain a buoyant atmosphere for Apples and Pears coming into bloom.

Give a fair amount of air to early Peach trees as the fruits are stoning, and spray with liver of sulphur to check red spider.

Dress peach borders with an approved fertiliser and water well in. Disbud and tie the growths and thin the fruits as often as necessary.

Bring in the last batch of Strawberry plants, and bring them on in an ordinary greenhouse without much heat.

Syringe Strawberry plants freely if growing in warm houses, affording copious supplies of water.

Plant young Vines early in the month, shortening the canes to within 18 ins. of the soil.

Dress vine borders after grapes are thinned with an approved vine manure, watering it well in.

Afford Muscat Vines a higher temperature when in bloom.

Ventilate fruit houses at this season with caution. Give all air possible, avoiding cold draughts, and close early.

Sow Dwarf Beans for succession. Syringe the growing plants often to keep red spider in check.

Sow Cucumbers for planting out in frames next month. Feed plants cropping heavily with frequent doses of liquid manure.

Plant Marrows on mild hotbeds, one plant to each light.

Plant Seakale thongs a foot apart in rows 18 ins. asunder.

Draw the lights off Carrot, Turnip, Lettuce, and Potato frames on warm sunny days.

Thoroughly water vegetables in frames if approaching dryness.

VEGETABLE GARDEN.

Sow Peas early in the month for use about the middle of July.

Put suitable support to early sown Peas: if sticks are unobtainable, use wire netting or strong twine.

Plant new asparagus beds early in the month. Sow Asparagus seeds for transplanting next spring.

Sow a few short rows of Globe Beetroot for early autumn use, on an unmanured plot.

Plant out Onions intended for large bulbs.

Sow winter greens of all sorts early in the month.

Plant out Cauliflowers sown in heat in February into the open garden.

Sow Cardoons and Celeriac in a frame if not already done.

Sow early varieties of Carrots in a warm border.

Sow Parsley early in the month, in rich soil.

Plant well-sprouted early varieties of Potatoes on a warm border, and watch carefully for the first appearance of those planted last month.

Give asparagus beds a good sprinkling of old soot, salt, or nitrate of soda, 2 oz. to the square yard.

Sow the maincrop of Celery early in the month, on a gentle hotbed.

Make up hotbeds for Frame Cucumbers, or early Vegetable Marrows.

Sow Seeds of Perpetual Spinach.

Sow Lettuces and Endive in the open ground.

Plant Shallots in rows 10 ins. apart, allowing 8 ins. between the bulbs.

Sow Onions in beds prepared last month.

Sow Tomato seeds in a heated house, or pot early this month for outdoor cropping later.

MAY.

OUTDOOR FLOWER GARDEN AND PLEASURE GROUNDS.

Mow all the lawns and trim the grass verges in the pleasure grounds at regular intervals of one week.

Roll paths and drives every Saturday. Give them a good brushing at least once in fourteen days.

Plant out Dahlias in rich positions in full sun. Set stakes to them immediately.

Lift bulbs from the flower borders and plant them in the wild garden.

Continue to plant bulbs from the greenhouse in the wild garden.

Sow seeds of British Wild Garden Flowers in bare patches in the wild garden.

Sow more hardy annuals for successional flowering, both in the rock garden and general parterre.

Sow seeds of Auriculas and Polyanthuses for blooming next spring.

Lift and divide Polyanthuses after they have finished flowering, for blooming next spring.

Keep the hoe going freely through the numerous flower borders.

Pull up winter bedding plants about the middle of the month.

Dig the borders thoroughly for summer bedding plants, working in plenty of well-decayed manure at the same time.

Plant out all kinds of half-hardy general and carpet bedding plants after well hardening them off.

Water all borders for bedding plants very thoroughly if the weather is dry, in order to give the flowers a good start.

Peg down any trailing plants, *i.e.* Ivy-leaved Pelargoniums, as soon as they are planted out.

Keep all newly planted bedding stuff thoroughly well watered.

Plant out in slightly shady spots such plants as Arums, Spiraeas, etc. etc., which have been forced.

Sow seeds of the following among many other half-hardy annuals out of doors: Ageratum, Amarantus, Arctotis, Balsam, Browallia, Celosia, Dimorphotheca, Helichrysum, Mimulus, Nemesia, Portulaca, Rhodanthe, Salvia, Tagetes, and Zinnia.

Sow seeds of biennials such as *Campanula pyramidalis*, Canterbury Bells, Hollyhocks, Honesty, Myosotis, Œnothera, Scabious, Sweet William, and Wallflowers.

Thoroughly thin out hardy annuals as they grow, otherwise they will smother and stifle themselves.

Continue the staking of all manner of border plants, remembering that "a tie so soon prevents their doom."

Continue to propagate perennial plants from offshoots, inserting these in slight shade and sandy soil.

Continue the lifting of Polyanthuses and Auriculas; dividing the large plants to obtain suitable stock for next season.

Mulch choice subjects in the perennial border with short, or old hotbed manure.

Sow more herbs if the sowing last month failed to be satisfactory.

Continue gathering flowers from borders regularly and frequently, also remove all dead flowers at once.

Cut down early flowered herbaceous plants as soon as they have ceased blooming, mulch with rich manure and apply liquid manure with a view to getting a second crop of flowers.

Prick off annuals from reserve beds into the mixed borders as they become ready, and as soon as gaps appear in those borders.

Remove seed heads from Rhododendrons and other choice flowering shrubs as soon as the flowers fade.

Clip dead flower heads from rock plants, and continue to cut them back after they have finished blooming.

Attend to routine work in the pleasure grounds, and see that it never gets a day in front of you.

Train Rose shoots over arbours and arches, tying them in early to prevent them being damaged.

Commence propagating Wallflowers from cuttings. This should only be done in the case of choice double varieties.

Thin blooms of extra choice sorts of Asters and other bedding plants, if already showing.

Dry off any bulbs not required for the wild garden by placing them on the surface of a sunny border in a thin layer.

Continue to weed lawns.

Propagate Violets.

Commence making plans for winter bedding and autumn alterations of all kinds.

Scrutinise the borders and make a note of any clashing colours to be changed in the autumn.

Weed borders regularly.

Prepare further reserve beds for seedlings used in winter bedding.

Complete any work for April which could not be done during that month.

THE GREENHOUSE.

Transfer young plants of Perpetual Flowering Carnations to a cold frame, and provide them with plenty of fresh air.

Stake and tie Carnations, Geraniums, and Pelargoniums, making the stakes as inconspicuous as possible.

Pot off rooted cuttings of Cytisus, which were taken last month.

Stand Chrysanthemums out of doors on ashes, in a sheltered position, not overhung by trees.

Furnish Chrysanthemums with temporary dwarf stakes.

Fill hanging baskets with such subjects as *Asparagus Sprengeri*, Begonias, *Fuchsia Cloth of Gold*, Ivy-leaved Geraniums, trailing Lobelias, and Tradescantias.

Sow Cinerarias in a pan or box in a cold frame, and do not overlook the claims of the graceful Star and Cactus types.

Stake and tie Herbaceous Calceolarias, using bamboo tips or other slender stakes.

Fumigate or vaporise Calceolarias to rid them of any lurking aphis, before the plants come into bloom.

Place Primulas to be retained, in a cold frame for the summer, and remove the remainder to the backyard.

Shift on all young growing stock as necessary, a safe general rule being to use pots two sizes larger than those the plants have just occupied.

Give Agapanthuses, Carnations, Geraniums and Pelargoniums occasional applications of liquid manure.

Pinch Carnations, Geraniums, and any young plants requiring this attention to promote the formation of a bushy habit.

Re-pot Primulas retained for future use.

Prick off Primula seedlings into pans or boxes, and place them in a frame for the summer months.

Top-dress Liliums as the fleshy roots show on the surface. Increase the water supply as growth proceeds.

Continue to keep a sharp look-out for aphis or thrip, and if present apply the antidote previously recommended.

Leave on some top ventilation overnight towards the end of the month if the weather is seasonable.

Damp the pathways in the mornings if there is sunshine.

Make a start with the final potting of Chrysanthemums, towards the end of the month, taking the big bloom class in hand first.

Re-stake Chrysanthemums temporarily as potting proceeds.

Shake out Cyclamens that have finished flowering and plant them out in a bed of rich soil in a cool pit or frame.

Spray Cyclamens twice daily and shade from bright sunshine.

HARDY FRUIT GARDEN.

Examine fruit borders to see if water is required.

Spray Peaches and other fruit with a mixture of sulphur, soft soap, and water, against mildew.

Examine newly grafted trees and remove all shoots below the graft. Cut suckers away at once.

Hoe all fruit borders and quarters regularly, to keep a loose tilth on the surface.

Thin the shoots on raspberry beds, leaving only a limited number of the best according to space.

Look out for black aphis on dessert Cherries, and syringe with an insecticide as soon as seen. Syringe Cherries regularly with soft water, to keep foliage clean and healthy.

Remove all gross shoots from wall-trained fruit trees, as, if left, these upset the balance of growth.

Plant out forced Strawberries, dipping them first in a sulphur mixture to eradicate red spider.

Water newly planted Strawberries to ensure a quick start. Hoe regularly to keep down seedling weeds.

Remove all protective material from fruit trees and carefully dry all blinds and netting. Label, and store it in a dry place.

Examine Apple trees for aphis, and spray early if the slightest trace is seen.

Water transplanted fruit bushes freely in dry weather.

Disbud Peaches and Nectarines, leaving sufficient shoots for extension.

Tie shoots on grafted stocks firmly to small sticks, to ensure support in stormy weather.

Spray grafts daily in very dry weather.

Partially thin the fruits on Apricot trees, leaving the remainder till after the stoning is finished.

Syringe all wall trees regularly on fine afternoons.

Dust Gooseberry bushes with hellebore powder for caterpillar, or spray with quassia extract.

Hoe between Strawberry plants on warm borders, and place clean straw down to keep the fruits clean.

Place nets over Strawberries in good time to protect the fruit from birds.

Pinch growths on cordon Pears back to the fourth leaf.

Thin the side shoots on bush fruit trees.

INDOOR FRUIT AND VEGETABLES.

Maintain a warm dry atmosphere for Fig trees in pots ripening their fruits, and cease syringing.

Water permanent Fig tree borders with liquid manure.

Support Melon fruits to prevent injury from damp.

Sow Melon seeds for late crops, putting out plants sown earlier in frames and matting the lights nightly.

Supply pot fruit trees with copious supplies of water, and occasional doses of weak liquid manure. Spray with soap and liver of sulphur.

Keep on a current of air night and day for Peach trees ripening their fruit, and fix a net under the trees.

Syringe and damp down late Peach houses twice a day and admit air freely when warm and sunny.

Thin Grapes, and allow short stalked kinds ample room. Stop sub-laterals at frequent intervals.

Give more air to Vines ripening their fruit and leave on nightly a chink of air top and bottom.

Make a sowing of Dwarf Beans in a cold span-roof frame, to precede those sown out of doors.

Sow seeds of Chicory in a sheltered position.

Throw the lights off Carrot, Turnip, and Potato frames towards the end of the month.

Put out Cucumber plants in spare hotbed frames, one plant under each light in a barrow-load of rich loamy soil.

Give weak liquid manure frequently to Peas swelling their pods, and afford all the light and air possible.

Fill any available deep frames with Tomato plants.

Top-dress Tomatoes that have set heavy crops of fruit with rich loamy compost, and apply occasionally a good chemical manure.

Pollinate female flowers of Vegetable Marrows, and pinch out the points of the shoots regularly.

VEGETABLE GARDEN.

Fill empty garden frames with strong Cucumber plants.

Plant out well-hardened Tomato plants against a south wall or in other sheltered positions.

Sow ridge Cucumbers where the crop is to mature. After 15th May Cucumbers raised in heat may be planted out.

Endeavour to get a good breadth of early Cauliflowers put into permanent quarters early in the month, in order that these may become well established by midsummer.

Give timely attention to all crops in the open garden requiring thinning out, but avoid unduly disturbing the beds when the soil is very dry.

Sow seed of Dwarf Beans any time this month.

Sow Runner Beans, if possible setting the seed near supply of water.

Make several sowings of Lettuce during this month; one at least where the crop is to mature.

Sow Corn Salad for summer and autumn eating.

Give Shallots a good application of old soot, or, if it can be had, a real good soaking of liquid manure.

Earth up Potatoes as soon as the tops are well through the soil, but avoid burying these too deeply.

Water Radishes and Saladings very freely.

Plant out Globe Artichokes and Cardoons in rich ground.

Use the hoe freely between Turnip rows and give liberal applications of an approved fertiliser.

Sow seeds of Bush Marrows in the open air early this month, or plant out seedlings growing in single pots into rich soil.

Pinch out the tips of all Broad Beans as soon as black fly is seen.

Sow Curled Endive for early use, selecting a shady border.

Plant out the main batch of Celery early this month.

Prick out seedlings of the various winter greens, sown in March, into temporary quarters. Keep the soil well watered.

Sow more Peas for succession, earthing the runs now showing through the soil.

Water rows of Peas showing flower freely in dry weather.

Feed asparagus beds in full "cut" freely with liquid manure.

Plant out Leeks for early winter use before 15th May in a very rich soil.

Sow Beetroot on well-dug soil, avoiding a site recently manured.

Sow a few rows of Salsafy early in the month, choosing a deeply dug soil.

Clear away all old Cabbage stumps as soon as the heart is cut, unless later shoots from these are desired, in which case keep the bed free from weeds.

Put Couve Tronchuda, Celery Cabbage, etc., into their permanent positions as soon as large enough.

JUNE.

OUTDOOR FLOWER GARDEN AND PLEASURE GROUNDS.

Continue the work of planting out summer bedding subjects with all possible speed on the same lines as mentioned last month.

Water newly planted bedding stuff every evening or in the early morning.

Water hardy annuals very frequently.

Water half-hardy annuals repeatedly to encourage strong growth if the weather be hot.

Water plants in the reserve flower garden just as much as those in the principal borders, since, if gaps occur in the latter, the plants in the reserve beds will be wanted.

Water the rock garden and the wall garden regularly and systematically if the weather is hot, otherwise many choice plants will perish.

Water the garden paths if the weather is exceptionally baking. This will produce a steam or mist most acceptable to the plants in the borders.

Water the lawn before any of the grass on it turns brown. These patches once formed are hard to get green again.

Water the shrubbery only in the driest of dry weather. In the case of newly planted shrubs, however, much more frequent watering is necessary.

Water the rose garden fully and freely, or the first blush of bloom will be badly affected.

Water your perennial or herbaceous

border before the plants start drooping and withering for want of moisture.

Water all florists' flowers and decorative plants intended for exhibition fully and frequently, since water for these is more important than for any others.

Water plunged pot plants generously, as their roots, unless they have come through the bottom, have only the moisture in the limited space of the pot to utilise.

Prune hardy shrubs about the middle or the end of the month, using sécateurs for the large leaved sorts to prevent damaging the leaves.

Fork over the surface of shrubberies after pruning is complete.

Sow Wallflowers, Myosotis, *Alyssum saxatile*, etc. etc., for winter bedding about the middle of the month if not already done.

Propagate Arabis, Aubrietia, Alyssum, etc. etc., by cuttings inserted in a shady reserve border.

Sow seeds of biennials for display in the mixed border, if not done last month.

Sow seeds of any of the perennials mentioned in February.

Sow a few more annuals for autumn blooming to fill up gaps in borders. This is the final sowing.

Cut hardy flowers regularly and frequently.

Cut Roses and Sweet Peas more freely than any other flowers.

Cut Lupines, Delphiniums, Anchusas, Doronicums, and similar plants down to the ground. Give a heavy mulch of manure and plenty of water with a view to obtaining September bloom.

Hoe herbaceous and general borders frequently.

Mulch all kinds of hardy plants with month-old cow dung if weather is hot.

Weed clumps of annuals by hand, and give the early sown ones their final thinning.

Prick out and re-plant annuals from the reserve beds into the general borders as soon as gaps are formed, and shade them lightly for a few days.

Prick out biennials and perennials 4 ins. apart each way, from seed sown last month.

Weed the rock garden. Continue to cut dead flowers off plants which have ceased blooming.

Continue to cut back rampant rock plants which are encroaching overmuch.

Protect Catmint (*Nepeta Mussini*) from cats, or it will soon be spoilt at this season.

Continue the weeding and mowing of the lawns.

Roll and sweep all walks and drives at regular intervals.

Dress weedy walks with salt or weed killer in hot, dry weather.

Burn all undesirable garden rubbish, seed heads, seeding weeds, etc., making only the soft harmless material into vegetable manure.

Remove seed heads from Rhododendrons and other choice shrubs.

Propagate perennials from "root cuttings" towards the end of the month.

Complete the lifting of bulbs from the borders, either planting them in the wild garden or laying them out to dry.

Shake soil off bulbs laid out last month. Clean them and store in boxes till next winter.

Continue all routine work, staking of herbaceous plants, thinning of their growths, removal of suckers, and of weeds nestling round the base of the plants.

Complete the removal of Polyanthuses from the spring beds as early as possible.

Make potpourri.

Make rose water.

Make scent from Stocks, and other sweet-smelling flowers. The early blooms usually carry more of it than those produced later.

Take the top bud out of Clarkias, Calendulas, Godetias, Helichrysums, and many other annuals in order to produce bloom on side-shoots.

Thin out the growths of Sweet Peas. If too many shoots are left the plants produce fewer flowers.

Clip Box edgings.

Cut back encroaching edging plants such as *Armeria maritima* (Thrift), etc., as soon as they have finished flowering.

Propagate Pinks by pipings inserted in a sandy soil.

Continue to train in climbing Roses and other similar plants, taking care not to injure their bloom.

Propagate Sweet Williams by cuttings or layers.

Propagate Iberis, Pansies, and Sweet Rockets by cuttings for early work in winter bedding.

Keep a sharp look-out for all kinds of garden pests, especially for aphis, and apply remedies at once.

Start saving seed of choice plants if this is to be done. In order that it shall be true to name, artificial fertilisation is necessary, also protection from bees.

Mow the grass in the wild garden. Any bulbs planted in it will not now be injured, as they are resting.

Continue making plans for next autumn's alterations. Go carefully over the entire garden this month, and if any part does not please you, plan out schemes which will.

Complete any work held over from May as early in June as possible.

THE GREENHOUSE.

Complete the potting of Chrysanthemums, leaving ample room for top-dressing.

Stake and tie all Chrysanthemums as soon as the work of potting is completed.

Stand big bloom Chrysanthemums on a hard bottom and lash the stakes to a strained wire.

Plunge bush Chrysanthemums in ashes or soil, in the latter event stand the pots on a small inverted pot.

Remove Nile Lilies to the open, placing them in a sunny situation, to facilitate the ripening process.

Break up Nile Lilies, and plant singly in shallow trenches, where this system is preferred.

Top-dress Roses and stand outside on a hard bottom and in full sunshine.

Keep a sharp look-out for aphis or mildew on pot Roses. Spray with soft soap and quassia chips for the former, and with potassium sulphide for the latter.

Prick off Cinerarias into boxes, rather widely apart, and place in cold frames.

Move frames so that they shall face north, for the reception of Calceolarias, Cinerarias, and Primulas.

Apply a light shading to frames facing south, and containing greenhouse plants other than those just mentioned.

Remove Indian Azaleas and Greenhouse Rhododendrons to a vinery or other warm house until they have made their annual growth and set their flower-buds.

Stand hard-wooded plants in the open air, on a hard bottom, selecting spots shaded from the midday sun, but not overhung by trees.

Plant *Azalea mollis* in the reserve garden with a view to using it for greenhouse decoration after a two-years' rest.

Stake and tie Liliums, taking care not to tie tightly or close to the point of the shoot.

Sow *Humea elegans* and *Rehmannia angulata Pink Perfection* at the beginning of the month.

Sow Herbaceous Calceolarias towards the end of the month. Cover the seed very lightly, place a sheet of glass over the seed-pan, and shade.

Cut away or tie down any extra vigorous shoots on hard-wooded plants to regulate the flow of sap, and to preserve the symmetry of the plant.

Introduce such stove plants as Achimeneses and Gloxinias into the cool greenhouse.

Stake and tie Rehmannias, using quite slender stakes.

Spray or syringe daily with a fine rose, Azaleas, Carnations, and Cyclamens.

Syringe Chrysanthemums in the afternoons of hot days.

Attend to watering in the early morning or late afternoon, the latter period being preferable.

Sprinkle the pathways morning and afternoon to produce a humid atmosphere.

Leave on both side and top ventilation continuously, during the summer months.

Remove all decayed flowers and foliage promptly, and keep weeds in check.

HARDY FRUIT GARDEN.

Mulch raspberry beds with rotten manure or a dressing of artificial manure, to assist fruit to swell.

Disbud outdoor Vines, leaving one shoot to a spur; train very thinly.

Spray Cherries, after the fruit is set, with quassia extract to keep down aphis.

Remove any Peach shoots damaged by aphis, and syringe regularly to keep trees clean.

Train growths on all Nectarine and Peach trees very thinly; many trees are ruined by crowding the growths.

Examine Apricots for maggot, and, if found, clear by hand-picking.

Water Apricot trees during a dry spell, as drought will cause the fruit to fall.

Thin dessert Cherries to ensure fine quality fruits.

Thin green Gooseberries as soon as large enough for bottling or for culinary use.

Tie or nail the shoots of Peaches regularly to keep the trees in good form. Take out all gross shoots, as those rarely make fruitful wood.

Feed and water Strawberries to assist the berries to swell quickly.

Protect late Strawberry blooms from June frosts in damp districts.

Put nets over strawberry beds to protect from birds.

Pinch the shoots on trained Apples and Pears, leaving the leaders for the present.

Thin the fruits on Strawberry plants if an especially fine crop is required.

Thin the fruits moderately on both Nectarines and Peaches, but reserve the final thinning till after the stoning period.

Keep peach borders well watered. Dryness at the root will cause fruits to fall, or arrest development.

Watch transplanted fruit trees closely, syringing and watering regularly in hot weather.

Thin the fruits on early varieties of Apples. Varieties such as *Lord Grosvenor* or *Early Victoria*, which usually set far too many fruits, need severe treatment.

Stop the side-shoots on bush Apples, but do not stop the leader.

Thin Gooseberries grown for dessert severely in order to get good quality fruit. Stop all side growth on Gooseberries, water copiously, and use plenty of manure, mulching the borders after watering.

Keep a watch on Gooseberry bushes for caterpillars and red spider.

Cut off and burn the tips of infested shoots if gooseberry mildew appears.

Put down straw on the latest strawberry beds after hoeing.

Water late Strawberries heavily during dry spells to assist the fruits, applying artificial or liquid manure previously.

Prepare for layering early Strawberry runners for forcing in pots next spring, or for planting on south borders.

Prepare ground for new strawberry beds a few weeks in advance.

Disbud outdoor Vines, and when developed stop the shoots at the second leaf beyond the bunches.

Loosen ties on newly grafted trees and tie the shoots to small sticks.

Remove all suckers from the base of fruit trees.

Spray red and white Currants to keep them free from aphis.

Dip shoots of Cherries infested with black fly in a good insecticide.

Regulate the shoots on wall Cherry trees, and pinch lateral growth at fourth leaf.

Thin dessert Cherries on walls, and if necessary spray before netting.

Thin the fruits on Apricot trees finally, and pinch back all shoots not required for extension.

Water Apricots with liquid manure, or give a dressing of artificial fertiliser to help the fruits to swell.

Regulate growth on Fig trees according to their condition. Train the shoots very thinly. Use manure only on trees carrying full crops.

Pinch off side-shoots on cordon Pears, but leave the leader growing.

Thin Pears moderately, giving final thinning when they are swelling freely.

INDOOR FRUIT AND VEGETABLES.

Give air freely to Fig trees ripening their fruits, and see that the borders do not lack water.

Admit more air to Melons as the fruit ripens, and maintain a warm, buoyant atmosphere. Plant for succession in the border as soon as all fruits are cut and the plants cleared out.

Pinch the shoots of pot fruit trees to encourage the formation of fruit buds.

Soak early peach borders with liquid manure after the fruits are all gathered. Spray the trees well with an effective insecticide to preserve healthy foliage, and syringe twice daily until the leaves fall. Keep ventilators fully open night and day to ensure thorough ripening of the wood.

Make preparations for layering Strawberry runners prior to forcing.

Thin late Grapes, allowing ample space for large berried kinds.

Give abundance of air night and day to ripe Grapes and maintain a dry atmosphere. Attend constantly to pinching and regulating the shoots.

Give Dwarf Beans in frames plenty of air, and afford copious supplies of water.

Syringe and damp down Cucumber houses several times a day. Pinch and tie in the growths almost daily.

Open the ventilators of the Tomato house wide on hot days, and allow at all times a little air.

Sow Tomato seeds for winter cropping.

VEGETABLE GARDEN.

Thin out Carrots sown last month to 3 ins. or 4 ins. apart. After thinning give the bed a dusting of old soot.

Sow seed of Chicory early this month for forcing in November.

Discontinue cutting Asparagus after 7th June.

Give asparagus beds a good coating of fat manure, or encourage the roots to build up strong crowns by repeated applications of liquid manure.

Sow more French Beans. Should the soil be dry, well water the drills before sowing.

Plant out Maize or Sweet Corn, Cardoons, and Celeriac, raised in heat last month, selecting a spot where water can be most easily supplied.

Plant out Ridge Cucumbers and Vegetable Marrows, sowing more for late supplies.

Lift the earliest planted Potatoes towards the middle of the month. Should the season be a dry one give the rows of these abundant watering.

Dust Onions intended for large bulbs very freely with soot, to keep mildew in check.

Reduce the shoots on each crown to one—the strongest—on beds of Seakale formed last spring.

Give Winter Onions a light dressing of nitrate of soda early this month, washing this well down to the roots with weak liquid manure.

Protect the heads of Cauliflowers on plants raised in heat from strong sunshine, or they will lose their whiteness.

Plant out further Cauliflowers for late summer and early autumn use. Do not stint water.

Make successional sowings of Lettuces, Radishes, Corn Salad, Endive, etc., to maintain a supply.

Give frequent dustings of well-slaked lime in early mornings to young Turnips just forming the true leaf.

Reduce Spinach seedlings while still small to about 9–12 ins. apart.

Transplant Beetroot in showery weather, and if possible shade for a few days from bright sun.

Make a good sowing of Carrots to provide a succession of sweet roots from August onward.

Water frame Vegetable Marrows carefully, or many of the earliest fruits will turn yellow.

Prolong the Marrow supply by cutting all fruit when of fair size.

Remove the tops of Pea shoots on rows now in flower if early pods are desired.

Mulch Runner Beans and other crops with strawy manure, grass clippings, etc., to conserve moisture.

Pull up early Peas. Fork land over and plant with Lettuces and Saladings.

JULY.

OUTDOOR FLOWER GARDEN AND PLEASURE GROUNDS.

Feed bedding plants with weak liquid manure.

Feed, hoe, and water hardy annuals as they need it.

Water and feed half-hardy annuals to encourage their bloom.

Continue watering the rock garden, reserve garden, and lawn if the weather be very dry.

Feed choice shrubs with weak liquid manure, especially if they were newly planted.

Feed Roses with liquid cow dung and soot.

Feed, hoe, and water the perennial or herbaceous border.

Feed florists' flowers, and give drinks of liquid dung to all decorative plants intended for exhibition purposes.

Feed Sweet Peas only seldom, since too soppy or rich a root-run will produce shoots instead of flowers.

Feed plunged pot plants now flowering freely, since they above all need extra food.

Continue the pruning of hardy shrubs if work was not completed last month.

Clip Privet, Hawthorn, and Holly hedges.

Burn all hard garden rubbish, as, for instance, hedge clippings and shrub prunings.

Fork over base of hedge and shrubbery borders after raking off clippings.

Sow more Wallflowers and other winter bedding plants if last month's supply is not satisfactory.

Prick out seedling Polyanthuses, Auriculas, etc., from seed sown last month.

Prick off seedling perennial plants, also biennials as they become ready.

Lift Canterbury Bells and Sweet Williams from the borders they have been in, planting backward bedding plants in their places.

Cut all flowers regularly and frequently.

Remove all dead blooms from border plants.

Hoe herbaceous and indeed all

flower borders frequently throughout the month.

Continue propagating Arabis, Alyssum, etc., for winter work.

Propagate rock plants by cuttings.

Propagate Geraniums from cuttings by inserting in a sunny position out of doors.

Propagate Pinks from pipings.

Continue mulching and weeding hardy plants as they need it.

Continue removing dead flower heads and cutting back lanky growths of all rock plants.

Cut Pansies back, lifting them out of the borders into the reserve garden.

Continue propagating perennial plants from root cuttings.

Dry off bulbs ready for re-planting.

Make more potpourri and rose-water, remembering that time flies.

Prune climbing Roses and other climbers if they have finished blooming.

Remove seed heads from flowers as fast as formed.

Start budding Roses.

Thin Dahlia growths and tie in all strong shoots.

Pinch tops out of border Chrysanthemums if they are running up too high.

Apply salt or other weed killer to weedy walks.

Disbud annuals to induce better flowers.

Shorten Fuchsia shoots.

Peg down rampant growing plants of trailing description to keep them in their places.

Syringe Petunias, Verbenas, Nemesias, and other choice bedding plants with weak insecticide to keep them clean and cool in warm weather.

Trap wireworms troubling choice plants.

Attend to Evening Primroses as to tying before they fall over.

Propagate Roses by cuttings.

Lift Ranunculuses, Polyanthuses, etc., if not already done.

Weed and generously hoe shrubberies.

Attend to all routine work in order that the garden may look as neat and happy as possible.

Complete all work held over from last month promptly.

THE GREENHOUSE.

Attend to the tying of Chrysanthemums as growth proceeds.

Stand Pelargoniums out of doors in full sunshine as soon as they have finished flowering.

Remove all decayed flowers from Pelargoniums, and gradually reduce the supply of water to them.

Shift young Cyclamens into their flowering pots towards the end of the month.

Continue to spray the entire stock of Cyclamen, morning and afternoon, taking care not to expose the plants to the direct rays of the sun.

Cut back the flower stems of second year Perpetual Flowering Carnations, after which re-stake and tie the plants.

Pot on young stock of Perpetual Flowering Carnations.

Shift the stock of *Salvia splendens* into its flowering pots, and keep the frame rather close for a week after the operation.

Find out by a slight pressure between the forefinger and thumb whether Greenhouse Rhododendrons and Indian Azaleas have set their flowering buds, and if they have, stand them outside in a sheltered position.

Continue to watch for mildew on pot Roses, and if it appears, apply the antidote previously recommended.

Stand winter-flowering Geraniums out of doors on a hard bottom in full sunshine to ensure the shoots being well ripened.

Place *Vallota purpurea* outside in a sunny position, to assist in ripening the bulbs.

Water *Vallota purpurea* sparingly for the next few weeks.

Prick off Herbaceous Calceolarias sown last month, into earthenware pans.

Continue to give established soft-wooded plants occasional applications of liquid manure.

Pot off seedlings of *Humea elegans* as soon as they are fit to handle.

Shift *Kochia trichophylla* into 6–7-inch pots as a final shift.

Prick off seedlings of *Rehmannia angulata Pink Perfection* into pans or boxes.

Give a second top-dressing to Liliums if the roots show on the surface.

Remove *Lilium longiflorum* to the backyard as it goes out of bloom, as it is useless for further decorative purposes.

Regulate the growth of climbing plants, where they hinder the admission of sufficient light.

Propagate Pelargoniums by cuttings, placing under a hand light or in a close frame if this method be preferred to striking them outside.

Remove Hydrangeas to the open

air as they go out of bloom, and stand them in full sunshine to ripen the wood.

Discard any superfluous plants of Hydrangea, and remove the spent flower trusses of those retained.

Attend carefully to the watering of all plants, and continue to damp the pathways morning and afternoon in bright weather.

Continue to keep a sharp look-out for aphis or thrip, and vaporise if either is discovered.

Layer Malmaison Carnations in a close frame, but admit air when rooted.

HARDY FRUIT GARDEN.

Train in all Plum shoots required for extension, and stop the remainder.

Watch Plum trees for aphis, and spray on the first appearance.

Thin choice dessert Plums. Guard against dryness at the roots of the trees, or the fruits will fall.

Remove superfluous suckers from raspberry beds, retaining only a sufficient number of strong canes for next year's crop.

Hoe through raspberry beds regularly, and give liquid manure when watering. Mulch the beds afterwards. Net securely against birds.

Fasten the young shoots of Loganberries out of harm's way, tying these up permanently when the fruit is picked.

Remove side-shoots of Red Currants, but leave the main shoot for extension.

Give plenty of water and stimulants to Gooseberries on light soils. Renew mulching if necessary.

Bud fruit trees this month.

Continue to layer Strawberry runners for pot-work or early borders.

Thin early dessert Apples, giving these plenty of water at the roots on light shallow soils.

Water nectarine and peach borders regularly, applying artificials to trees bearing heavy crops, and mulch with rotten manure to conserve moisture.

Give late Strawberries copious supplies of water and liquid manure, to assist the later fruits to develop.

Destroy old strawberry beds as soon as the fruit is picked, to make room for other crops.

Cut off early Strawberry runners now rooted from the parent plant, and partially shade them for a few days. Plant out as soon as they have recovered from the check.

Layer late Strawberries, keeping the soil in pots moist to induce quick rooting.

Thin this year's growth on Blackberries and Loganberries. On light soils water well in dry weather.

Carefully net Gooseberries for late fruiting on cool borders, renewing the mulch if necessary.

Thin out finally all dessert Pears.

Water cordon Pear and Apple trees regularly, where growing in narrow borders.

Pick all soft fruits just before they are fully ripe.

Pinch the lateral growths on outdoor Vines closely, and expose the fruit to the sun as much as possible.

Spray Vines with insecticide two or three evenings in succession if mildew appears, and wash off with clean water.

See that the vine border does not lack moisture.

INDOOR FRUIT AND VEGETABLES.

Spray vacant Fig trees with liver of sulphur to prevent red spider.

Attend to pinching and thinning the shoots of Fig trees. Thin the second crop rather severely to ensure good ripe fruits.

Give a liberal amount of air to Melon plants in frames on sunny days, pinching the new shoots to prevent overcrowding. Keep the fruits off the soil.

Stand pot fruit trees that have finished bearing outside in a sunny position, and spray them with an insecticide.

Give Apple and Pear trees in pots frequent applications of weak liquid manure.

Syringe late Peach trees twice a day and water the border well if approaching dryness.

Give abundance of air on sunny days to Peach trees ripening their fruit, and allow a little top and bottom ventilation at nights.

Layer the strongest first runners of Strawberry plants into 3-inch pots, and keep the soil in a moist state until rooted.

Spray early Vines with liver of sulphur solution after completing gathering.

Pinch out the leading points of young Vines, when they have reached the top of the house. Pinch out the points of lateral growth beyond the first leaf.

Top-dress Cucumbers with equal parts loam, leaf-soil, and manure.

Pot June-sown Tomatoes into 3-inch pots, and keep them growing in a sunny airy position.

Top-dress the main crop of Tomatoes with rich soil. Pinch out side growths once a week, and shorten bottom leaves if a heavy crop of fruits are set.

Sow Parsley thinly in frames for a winter supply.

VEGETABLE GARDEN.

Pay strict attention to Cucumbers growing in frames. Give very frequent syringings, and when several fruits are set use either liquid manure or artificials freely.

Remove all flower stalks from Seakale. If this is done before the flowers open they make an excellent vegetable.

Weed and keep new asparagus beds well watered.

Sow a few rows of dwarf early Peas before July 10th, covering the seed deeper than is usual for earlier sowings.

Give maincrop Potatoes their final earthing up early in the month.

Spray Potatoes with Bordeaux or Burgundy mixtures twice during the present month allowing an interval of a fortnight between each spraying.

Keep Runner Beans showing flower buds well watered. Syringe the leaves after each hot day.

Bend over the tops of winter Onions as soon as these show signs of finishing their growth. Discontinue applications of stimulants after the first week of the month.

Keep the soil where Maize is growing always uniformly moist, feeding occasionally with liquid manure.

Plant winter greens of various sorts between the rows of second early potatoes, removing leaves here and there where these may give undue shade.

Keep Leeks intended for large specimens well supplied with manure water, and earth them up again.

Pay frequent attention to rows of Celery, dusting the leaves freely with soot and keeping the soil moist.

Give Celeriac plenty of water. Continue to plant for a late crop.

Sow more Shorthorn Carrots in light soil if the district is warm.

Sow a few short rows of Lettuce for autumn use, and hoe freely between plants now forming hearts.

Sow Endive during the present month. Batavian is preferable, as it is hardier.

Make a small sowing of Cabbage for spring use towards the end of the month, delaying the sowing for general crop until next month.

Watch outdoor Tomatoes, carefully removing all side-shoots and basal growths.

Feed Tomato plants carrying a heavy crop freely with liquid manure.

Lift all early Potatoes, selecting the tubers required for next season's planting, allowing them to remain on the ground for a few days.

Plant Cabbages on land vacated by second early Potatoes at the end of the month.

Sow Spinach Beet for autumn and winter use.

AUGUST.

OUTDOOR FLOWER GARDEN AND PLEASURE GROUNDS.

Start layering Carnations without delay.

Bud more Roses.

Take more Rose cuttings.

Take further Geranium cuttings, inserting them out of doors in a sunny spot.

Complete pruning of hedges, etc., at once.

Disbud Michaelmas Daisies to improve bloom.

Disbud border Chrysanthemums.

Hasten the growth of winter bedding plants if this is slow, by applying soot water.

Continue feeding and watering all plants which appear to need it.

Start making preparations for winter bedding.

Dig over vacant land early.

Sow hardy annuals out of doors.

Re-make the reserve garden, discarding all summer bedding plants, which will not now be needed.

Remove flower-buds from any too forward winter bedding plants, otherwise they will be little use later.

Propagate various kinds of summer bedding plants by taking cuttings, inserting these out of doors.

Propagate Violas in the herbaceous border by cuttings.

Take cuttings of Fuchsias.

Plant at end of the month such subjects as Amaryllises and Colchicums.

Propagate more Pansies from cuttings thrown up early this month.

Propagate such plants as Hydrangeas, Ice Plants, Heliotrope, Petunias, Salvias, and Verbena, which now occupy the borders, by means of cuttings.

Water and feed all plants intended for autumn blooming, especially Sweet Peas and Roses.

Remove basal shoots and suckers of Roses before they grow to any size.

Propagate many kinds of rock plants by cuttings or rosettes, especially Saxifrages, Sedums, and Sempervivums.

Plant out Brompton Stocks in a sheltered spot to give early bloom next year.

Prepare beds for planting Daffodils, Narcissi, and Tulips.

Look after shrubs, removing dead flowers.

Hoe shrubbery and other borders very frequently, removing weeds and stones.

Roll and mow lawns regularly.

Give garden paths a further watering of weed killer if wet weather immediately followed last month's dressing.

Weed lawns.

Trim grass verges to give a neat, smart appearance.

Plant out seedling Pansies to supply edging in place of those lifted last month for propagation purposes.

Start drying flower garden herbs, cutting them when in flower.

Make ready a place for this year's leaves, which will start falling before the end of the month.

Consider any forthcoming garden alterations and make plans fully now to save time later.

Overhaul colour borders, noting flowers with clashing colours and decide how to re-arrange them.

Prick out late sown winter bedding plants as early as possible and hasten their growth.

Be sure to have all plants securely tied up by the end of the month, for September is often windy.

Plant any kind of bulbs in the wild garden.

Continue all routine work conscientiously. If care is not taken now the borders may lose much of their grace and beauty.

Complete all work unavoidably held over from July as early as possible.

Leave for a fortnight's holiday early in the month, or you may have to do without a holiday this summer.

THE GREENHOUSE

Propagate Zonal Geraniums by cuttings; insert the cuttings singly into 3-inch pots filled with sandy soil, and winter them in these pots.

Propagate *Aloysia citriodora*, *Eupatorium atrorubens*, *Fuchsia procumbens*, Heliotropes, Petunias, and *Trachelium caeruleum*, by cuttings, inserting in a close shaded frame.

Pot up Herbaceous Calceolarias into 3-inch pots towards the end of the month.

Pot up Cinerarias into 4-inch pots direct from the boxes into which the seedlings were pricked.

Examine Cinerarias for the Leaf Mining Weevil, and if present in small numbers, destroy by a gentle pressure of the leaf between the finger and thumb at the affected part.

Spray Cinerarias with a solution of quassia chips if badly infested with the above-mentioned pest, making sure that the under-sides of the leaves are thoroughly wetted.

Continue to give attention to the tying of Chrysanthemums.

"Take" the first crown bud of varieties of Chrysanthemums requiring this treatment.

Give Chrysanthemums a light top-dressing as soon as roots appear freely on the surface.

Apply liquid manure to Chrysanthemums as soon as the buds are "taken."

Propagate Cacti and other succulent plants early in the month, allowing the cut part to dry in the sun, prior to insertion in the soil.

Inure Hydrangeas and Pelargoniums to the air and light as the cuttings become rooted.

Pot up two-year-old Cyclamens which have been planted out in a pit or frame.

Sow Cyclamen thinly in a seed pan, which keep close and shaded until germination takes place.

Pot up Nile Lilies which were planted out, towards the end of the month.

Re-pot Nile Lilies, which were allowed to remain in their pots during the summer.

Remove all decaying matter promptly, also keep down weeds, and let cleanliness and tidiness be the order of the day.

HARDY FRUIT GARDEN.

Feed Fig trees bearing full crops regularly and give plenty of water.

Remove rank growth on Fig trees; train remainder very thinly, exposing the fruits to full sun.

Cut out old canes so soon as the Raspberry crop is picked.

Remove the nets from raspberry beds, label and store away for future use

Keep the young Raspberry canes thinned to a moderate number.

Pick the flowers off Perpetual Fruiting Strawberries for the last time, and keep the plants watered for late fruiting.

Thin Morello Cherries early for culinary use; train the shoots in carefully, but keep the fruit exposed. Net against birds. Give the trees plenty of water.

Expose Peaches and Nectarines to the sun as much as possible, to ensure fine flavour.

Give plenty of water to all fruits under glass copings.

Trap woodlice on fruit trees with the hollow stems of broad beans.

Top Gooseberry shoots for American gooseberry mildew, and spray the bushes afterwards.

Give late varieties of Apples, Nectarines, Peaches, Pears, and Plums their final thinning.

Give dessert Cherry trees a thorough washing with the garden engine after early fruit is picked.

Pinch all lateral growths on Nectarines and Peaches.

Clean up strawberry beds after the fruit is picked. Hoe them or fork them lightly over.

Prune Black Currants as soon as the crop is cleared off.

Clean Apricot trees as soon as the fruit is picked, and give an extra watering at the roots.

Look over and pick Nectarines and Peaches every few days. Gather just before they get fully ripe—especially for packing.

Train the necessary shoots on Plum trees for extension, and remove any not required.

Get nets off Gooseberry quarters, when the crop is over.

Water late Pears and pinch out all lateral growth on trained trees.

Keep all strawberry beds free from runners.

Stop and tie shoots on Fig trees.

Place muslin bags on ripening Figs if wasps are troublesome.

Prune early varieties of Peaches as soon as the fruit is picked, dispensing with as much of the old bearing wood as possible.

Protect ripe Morello Cherries on north walls from birds and wasps.

Place nets on fruits and hang up bottles of syrup as traps for flies and wasps.

Layer late varieties of Strawberries for planting next spring.

INDOOR FRUIT AND VEGETABLES.

Stand pot Fig trees in the sun outside to ripen the wood.

Keep a little fire-heat on in the Fig house during damp or dull weather and maintain a buoyant atmosphere.

Give Melon plants ripening their fruits a warm, airy atmosphere and keep the borders on the dry side.

Keep peach borders well watered, applying dressing of concentrated fertiliser to overcropped trees.

Defoliate late Peaches lightly in order that the fruit may colour well.

Pot Strawberry plants into 6-inch pots, standing the plants in a sunny position on ashes, and syringe them twice a day.

Give Muscat Grapes that are ripening a warm, airy atmosphere.

Renovate early vine borders.

Maintain a warm growing atmosphere in the Cucumber house, assisting the plants with weak manure water.

Sow seeds of Lettuce and Endive, and when large enough prick them off into frames.

Collect manure for mushroom beds and turn it three times a week.

Re-pot June-sown Tomato plants into 5-inch pots and keep them growing sturdily near the glass.

Give maincrop Tomatoes frequent applications of farmyard manure water.

VEGETABLE GARDEN.

Lift Shallots, if not done last month, and after thorough drying, store the bulbs in a cool shed.

Give transplanted Onions grown for large bulbs, a dressing of nitrate of soda early in the month, not more than two ounces to the square yard.

Avoid over-watering or over-feeding Tomatoes growing in the open air, or the fruits will split.

Gather fruits on all outdoor Tomatoes before fully ripe, finishing the ripening in a warm room or closed box.

Water outdoor crops as they need it with water which has been exposed to full sunshine for a few hours.

Keep Runner Beans well picked; even if only a few dozen pods are allowed to ripen the effect upon production is serious.

Keep late Peas well watered, or mildew may spoil the whole row.

Cut all Vegetable Marrows before the skins get too hard. Store those not used immediately in cool quarters for the winter.

Make the main sowing of spring Cabbage during the early part of the month.

Make a sowing of Red Pickling Cabbage this month, transplanting to permanent beds next spring.

Sow Lettuce early in the month to provide plants for filling cold frames for early winter use.

Make a final sowing of Parsley, selecting a nice sheltered spot.

Sow winter Spinach any time during the month, for heavy soil selecting the prickly seeded variety.

Remove all old worn-out leaves from rows of Spinach Beet, and give the bed a good soaking with fairly strong manure water.

Cut all Ridge Cucumbers before the points of the fruit turn yellow; store those not required, in a dark shed, with the ends in a saucer of water.

Continue to put out late varieties of Broccoli, giving the plants plenty of water until established.

Earth up early Celery and blanch by means of stout cardboard or brown paper.

Sow Turnips for winter use. The yellow flesh varieties have exceptional good keeping qualities.

Sow a little seed of one of the early varieties of Cauliflowers during the early part of the month.

Sow Onions for early use next year before 10th August. Consult seed lists for suitable varieties.

Pull up Peas as soon as they are over, sowing ground immediately with winter food.

SEPTEMBER.

OUTDOOR FLOWER GARDEN AND PLEASURE GROUNDS.

Sow seeds of hardy annuals for producing early blooms next summer. Suitable sorts to include, among others, the following:—Agrostemma Coeli-rosa, Calendula Meteor, Calliopsis bicolor, Centaurea Cyanus (Cornflower), Clarkia elegans and pulchella, Collinsia bicolor and grandiflora, Eschscholzia, Eutoca, Flos Adonis, Godetia all varieties, Limnanthes, Linum, Lupinus, Malope, Nemophila insignis, Nigella hispanica, Poppy the Shirley, Saponaria calabrica, Silene pendula compacta, Virginian Stock (*Malcomia maritima*), and Viscaria oculata.

Clear away annuals from the flower borders as soon as they have finished blooming.

Cut down plants as soon as bloom ceases, or at least remove dead flower heads to prevent seeding.

Continue watering flower borders, the rock garden, etc., if weather is very hot.

Commence sweeping of leaves before the place becomes badly littered with them.

Discontinue all feeding of flowering plants early this month, as to continue would be to waste good material.

Discontinue the weekly mowing of lawns, greens, grass paths, etc., on 30th September.

Turn over heaps of rotted vegetable matter. The material will soon be wanted for digging in.

Cut out suckers from Roses and other climbers. These do much harm if left.

Cut back over rampant growth of any climbers (Roses, Clematis, Wistaria, etc. etc.) before the winter, and tie in all long shoots firmly before the gales come.

Obtain a further supply of Rose cuttings if those put in earlier have died.

Continue to propagate the host of bedding plants, inserting the cuttings this month in frames.

Commence taking cuttings of Alyssum, Calceolarias, and Pentstemons. August is too early for this work.

Take more cuttings of Pansies and Violas from the herbaceous border or reserve garden to ensure an ample supply next year.

Sever Carnation layers and re-plant them in their permanent positions.

Push forward plans for structural alterations, and have all materials in readiness.

Commence to propagate shrubs again by cuttings inserted firmly in a deep nick made with the spade.

Propagate herbaceous perennials by

means of cuttings which are now freely thrown up.

Stake and securely tie-in such plants as Chrysanthemums, Dahlias, Hollyhocks, Michaelmas Daisies, Sunflowers, and tall Thalictrums, otherwise they may easily be broken by being blown over.

Protect all flowering plants from pests, especially from earwigs, which are very troublesome just now.

Plant Polyanthuses into their flowering positions.

Plant out Pink pipings in their permanent positions, or transfer them to a cold frame.

Continue disbudding flowering plants if extra choice late flowers are desired.

Continue all routine work religiously.

Make great efforts to prolong the beauty of the garden as long as possible by looking well after all plants at this trying period.

Cut flowers regularly and frequently. The more you cut the more you will get if the autumn is open.

Stir the surface of flower borders and shrubberies every week to prevent autumn weeds getting a hold.

Make a list of flowering plants, climbers, perennials, bulbs, etc., you will require, and order them early.

Take a final scrutiny of your colour borders in case there are early frosts next month, making notes for future use.

Complete all flower garden work unavoidably held over from August as early as possible.

THE GREENHOUSE.

Pot Italian and Roman Hyacinths, three bulbs in a 5-inch pot, and plunge in sandy soil or ashes.

Pot and plunge Daffodils, especially such serviceable varieties as Emperor, Empress, and Golden Spur.

Pot and plunge such Narcissi as Paper White, Poeticus, and Poeticus ornatus.

Pot Chionodoxas, Crocuses, Freesias, and Scillas.

Cut down Pelargoniums early in the month, and place in a cold pit or frame to "break." Syringe them daily in the afternoon.

Sow Clarkias and Schizanthuses in pans or boxes early in the month, and place in a cold frame.

Sow Machet Mignonette in 5-inch pots and place in a cold frame, for winter blooming.

Sow Sweet Peas in 3-inch pots, for indoor culture.

Propagate Fuchsias by cuttings in a close frame.

Propagate *Crassula coccinea* in pots of sandy loam in a well-ventilated frame.

Continue to "take" the buds of big-bloom Chrysanthemums.

Disbud bush Chrysanthemums as soon as the work can be done without damaging the buds.

Allow the small-flowered varieties of Chrysanthemums—such as Kitty Bourne—to develop naturally.

Keep a sharp look-out for aphis and the leaf mining weevil on Cinerarias, and if present apply the remedies previously recommended.

Remove the glass cover from Cyclamens as the seedlings appear.

Thin out Mignonette in pots towards the end of the month.

Pot off seedling Clarkias and Schizanthuses towards the end of the month.

Re-pot Pelargoniums as soon as they have started into fresh growth. Use pots a size smaller than those the plants flowered in.

Attend to all necessary repairs both outside and inside the house, painting the house outside or inside if necessary.

Wash the glass and woodwork, prior to arranging the plants for the winter.

Bring in winter-flowering Geraniums, and give them a light airy position.

Bring in the entire stock of Carnations and *Salvia splendens*. Continue to feed the latter until they begin to show colour.

Collect seed of tuberous-rooted Begonias.

Withhold water from Liliums by degrees.

Discontinue shading after the middle of the month.

Surface dress all hard-wooded plants, and wash their pots.

Bring in all hard-wooded plants during the last week of the month, and group them together as far as practicable.

Bring in *Vallota purpurea*.

See that the heating apparatus is in good working order.

Reduce the ventilation on cold nights.

HARDY FRUIT GARDEN.

Mark fruit trees which are not bearing but making vigorous growth, for root-pruning.

Plant main beds of Strawberries on well-prepared ground.

Thin dessert Plums severely; give plenty of water, and renew mulching if necessary.

Examine budded stocks and loosen ties if too tight.

Mark all inferior or worn-out fruit bushes for destruction later.

Whitewash and thoroughly cleanse the fruit room, in readiness for fruit storing.

Prepare composts in readiness for planting and top-dressing later.

Prune off all superfluous growth on Apples and Pears and expose the fruits to the sun.

Remove suckers from the base of Cobnuts and Filberts.

Gather early Apples and Pears for immediate consumption. Do not attempt to store these.

Prepare stations for planting fruit trees.

Transplant early Nectarines and Peaches which have completed their growth this month. Make them firm.

Keep a sharp look-out on ripening fruit, and pick on fine days.

Deeply trench and heavily manure ground for new raspberry plantations.

Commence root-pruning if weather is not too hot and dry.

Water transplanted trees, and syringe overhead on warm afternoons.

Place all orders for fruit trees with the nurseryman in good time. Late comers get the leavings.

Cut out all old fruiting canes from Loganberries and train or tie the young canes into their permanent positions.

Put spare lights in front of late Peaches to ripen up the fruits.

Destroy all wasps' nests, with potassium cyanide.

Get all preparations for extensive fruit planting forward.

Give plenty of water to trees under glass copings if weather is dry.

Cut off all superfluous growth on Figs, and root-prune if growth is gross. Avoid rich soil when planting.

Pick Mulberries for bottling.

Expose grapes on outdoor Vines to the sun as much as possible to ripen them thoroughly.

INDOOR FRUIT AND VEGETABLES.

Apply soakings of liquid manure to Fig trees that have borne heavy crops.

Maintain a night temperature of 75° F. for Melons. Damp the house down on sunny days and discontinue syringing.

Stand pot fruit trees in a sunny position outside.

Give all the air possible to Peach trees night and day.

Dip Strawberry plants in soap and liver of sulphur solution.

Cut out all lateral growth of early Vines. Keep ventilators wide open night and day, with heat turned off.

Keep a little heat and air on constantly for Vines carrying ripe fruit.

Maintain a minimum temperature of 75° F. for Cucumbers.

Make up mushroom beds in warm dark sheds.

Re-pot Tomato plants for winter cropping into 10-inch pots, and tap the supports daily to ensure pollination of the fruits. Keep a little fire heat on for the main crop, and grow the plants under drier conditions at this season.

VEGETABLE GARDEN.

Bend over the tops of Onions grown for large bulbs, and as soon as these are withered, carefully lift the bulbs and complete the ripening in a warm house.

Lift maincrop Onions early in the month and lay out thinly on sacks or in boxes to get fully ripened previous to storing in winter quarters.

Continue to gather Dwarf or Runner Beans before the pods get stringy. Give liberal supplies of water to any rows still in flower.

Reduce the foliage on outdoor Tomatoes early in the month, exposing the fruit to the full sun. Give the plants liberal supplies of liquid manure.

Cut away many of the extra large leaves upon the Vegetable Marrows or Ridge Cucumbers in order that the latest formed fruits may have the benefit of full sunshine.

Give the latest sown rows of Dwarf Beans a little protection, if early frosts threaten.

Get the bed of spring Cabbage planted as early in the month as the plants can be conveniently handled.

Pot up seedling Cauliflowers from seed sown last month, and stand the pots on a bed of ashes in a cold frame.

Thin out rows of Turnips and Spinach sown last month and encourage the plants to make rapid progress by the free use of the hoe.

Give maincrop Celery copious supplies of water throughout the month, earthing up the early runs again.

Plant out a good batch of Endive in a sheltered border.

Lift and store maincrop Potatoes towards the end of the month.

Lift Beetroot carefully with a fork, and after twisting off the tops, put in clamps or store in a cool shed.

Give Leeks an abundance of liquid manure, well earthing up again those required for early use.

Sow a little Corn Salad in a warm border early in the month, to provide a late autumn supply.

Gather good-sized bunches of all the more popular potherbs, and when thoroughly dry hang these in a shed free from dust, or better still place in muslin bags.

Give plenty of air to young Carrots growing in frames throughout the month.

Lift and store the main crop of Carrots, storing between layers of dry soil or sand.

Give backward plants of Lettuce a watering with a half-ounce of nitrate of soda to each gallon of water.

Give Cauliflowers which promise to be late in forming heads plenty of liquid manure.

Lift and store Salsafy sown extra early which seems inclined to go to seed.

OCTOBER.

OUTDOOR FLOWER GARDEN AND PLEASURE GROUNDS.

Take up summer bedding plants immediately this month starts. Destroy them, or pot them on for green house use.

Clear away all hardy annuals sown last spring early during the month if winter bedding is to be put down.

Dig and manure beds which have had summer bedding plants in them.

Plant all kinds of winter bedding stuff, *Alyssum saxatile*, *Arabis albida*, Canterbury Bells, Myosotis, Polyanthuses, Sweet Williams, Wallflowers, etc.

Plant all kinds of bulbs,in the borders, in the rock garden, in the grass (dwarf sorts such as Aconites, Crocuses, Scillas, Snowdrops, etc.), and in the wild garden.

Plant all kinds of spring colour beds. Tulips make some of the best subjects for this work.

Plant any of the following among other subjects in the rock garden:—Æthionema, Alyssum, Anchusa (dwarf), Androsace, Anemone (dwarf), Antennaria, Arenaria, *Aster alpinus*, Aubrietia, Campanula (dwarf), Crucianella, Dianthus, Dryas, Gentiana, Helianthemum, Hepatica, Iberis, Lithospermum, Onosma, Phlox (alpine varieties), Primula, Saxifraga (all varieties), Sedum, Sempervivum, Silene, and Veronica (dwarf sp.).

Cut down perennial plants as soon as they go out of bloom, clearing away the refuse.

Continue to cut the flowers of plants still in bloom as freely as possible with a view to getting further flowers.

Make a start on all kinds of structural alterations, making new paths, building garden steps, erecting poles, pergolas, arbours, and arches, and so on.

Complete the plans for further structural alterations, and get materials ready for carrying them out.

Sweep up leaves which now fall rapidly, regularly twice a week, or the place is apt to become a wilderness with the litter they make.

Insert further supply of Calceolaria, Pentstemon, and Alyssum cuttings if those inserted last month have damped off.

Roll paths, drives, and lawns regularly once a week, preferably after well brushing them.

Cut down Dahlias and lift the roots, storing in a frost-proof shed.

Lift small seedling perennials from reserve beds as soon as the weather turns cold, and put them into a frame.

Avoid mulching rose-beds at this time of the year, as the manure may damage the roots.

Apply basic slag to lawns and greens at the rate of 4 oz. per square yard.

Apply Tonk's manure to rose-beds unless you prefer to use this formula in the spring.

Trench land intended for autumn planting of perennials as early in the month as possible.

Tie up all late flowering plants, Chrysanthemums, Sunflowers, etc. etc., for they may bloom till 31st October.

Top-dress pockets in the rock garden with fine soil. Put pieces of glass over choice Androsaces, etc., to throw the rain off them.

Remove dead flowers, leaves, and other rubbish from the rock garden. Renew labels in it.

Buy and plant new Roses and other climbers.

Buy turf for renovating bare patches on the lawn.

Lift all tender plants propagated out in the open, putting them in heated houses or frames for the winter.

Plant out permanently a further stock of layered Carnations, protecting them from slugs by rings of zinc.

Prepare sites for new shrubberies.

Go through your garden notes, correlating details together to serve as a guide for future alterations.

Continue all routine work unceasingly to give the garden a bright and neat appearance.

Complete all September work proper, as early as possible during the present month. Delays are dangerous, for the weather may break up at any time and make outside work impossible.

THE GREENHOUSE.

Prune pot Roses, and rectify the drainage if deranged, prior to standing them in a frame.

Stow away Cannas, Crinums, Fuchsias, and Liliums on their sides under the staging, or in a frost-proof shed.

Stand Deutzias and Philadelphuses in a frame.

Bring in Calceolarias, Clarkias, Mignonette, Schizanthuses, and Sweet Peas, and place them on shelves near the glass.

Pot up Hyacinths, *Iris reticulata*, Sparaxises, and Tulips, and plunge in sand.

Pot Astilbes, *Azalea mollis*, and Lilacs as they come to hand, and stand in a frame.

Continue to disbud bush Chrysanthemums omitting the small-flowered varieties.

Spray all Chrysanthemums with a solution of potassium sulphide as a preventive of mildew.

Pick off all decayed foliage on Chrysanthemums and wash the pots.

Bring all the Chrysanthemums indoors by the middle of the month, beginning with the big bloom varieties.

Give Chrysanthemums bi-weekly applications of liquid manure until the flowers show colour.

Disbud Perpetual Flowering Carnations.

Pinch Mignonette when 2 ins. high.

Pinch Clarkias, Schizanthuses, and Sweet Peas when 4 ins. high.

Pot on young Pelargoniums as they fill the small pots with roots.

Pot up *Lilium longiflorum* and *L. longiflorum eximium* (*Harrisii*), allowing one bulb to a 6-inch pot.

Shake out tuberous-rooted Begonias, arrange the tubers, crown upwards, on a shallow tray, and store in a cool, dry frost-proof room.

Fumigate or vaporise the house as soon as the various soft-wooded subjects have been brought in.

Apply water with great care from now onwards, distinguishing between plants in active growth and those comparatively at rest.

Attend to watering early in the day, and be careful not to spill water about the house.

Ventilate as freely as the state of the weather will permit, leaving a little air on overnight unless frost occurs.

Apply a little fire-heat if frost occurs, or to dispel damp should the weather prove foggy.

Remove all decayed flowers and foliage promptly.

Shift Cinerarias into their flowering pots.

Get a good supply of potting materials under cover for winter use.

HARDY FRUIT GARDEN.

Use the garden engine on wall-trees after fruit is picked if insects are troublesome.

Use plenty of lime when planting or root-pruning stone-fruits.

Fork over the soil between fruit bushes after treading down during fruit picking.

Commence winter pruning any time after growth has ceased.

Renovate fruit borders where old trees are showing signs of exhaustion, and replace worn-out soil with a rich compost.

Store late varieties of both Apples and Pears after they are thoroughly ripened.

Put grease bands on orchard trees early this month.

Fill up all vacant spaces on fruit walls with young trees.

Remove superfluous leaves on Peach trees, to assist the thorough ripening of the wood.

Pick Cobnuts and Filberts on a dry day, and store in a cool cellar.

Plant Raspberries in well-prepared ground.

Prune fruit-bushes early, so that the

bushes have the benefit of full exposure.

Give liberal treatment to fruit-bearing trees when top-dressing.

Plant fruit trees and make very firm.

Secure newly planted trees to stakes without delay.

Partially lift and root-prune all Peach trees making extra strong growth and amend errors in drainage.

INDOOR FRUIT AND VEGETABLES.

Syringe early permanent Fig trees after second crop is gathered until the leaves fall.

Give ripening Figs a warm airy atmosphere.

Prune and put in shape all pot fruit trees.

Re-pot pot fruit trees, in good fibrous loam, adding bonemeal, lime rubble, and wood ashes. Plunge the pots up to the rims in ashes in a sheltered position outdoors.

Prune early Peach trees, aiming at an even distribution of this year's growth.

Renovate early peach borders with a good dressing of bonemeal and fresh loam.

Spray Peach trees when all leaves have fallen with a caustic alkali wash.

Remove Strawberry plants in pots to good light frames. Give plenty of air except in very frosty weather. Water carefully and avoid excessive moisture.

Cut back the main shoots of early Vines half their length, and in two or three weeks' time prune to a prominent bud at two or three eyes from the base. Cleanse the house thoroughly, and wash the Vine rods with a strong solution of an insecticide. Top-dress the borders with an approved Vine manure and bonemeal, adding a layer of fresh loam.

Cut out the sub-lateral growth of late Vines to allow both fruit and wood the full benefit of sun heat. Examine bunches weekly for decaying berries.

Plant Lettuce and Endive in frames and admit plenty of air.

Damp the Mushroom house down daily, and avoid overheating. Make a second bed for succession.

Put the lights on Parsley frames and keep well ventilated.

Pack Potato sets in single layers in boxes to sprout for early forcing, and place them under the greenhouse stage.

Lift Rhubarb roots for forcing, and leave them exposed on the surface for two or three weeks.

Maintain a warm, dry atmosphere for Tomatoes. Top-dress the plants as the roots show on the surface, and sow seeds for early crop.

VEGETABLE GARDEN.

Protect Cauliflowers sown in August from early frosts.

Fill an empty frame with good plants of Parsley, taking care to lift this with plenty of soil on its roots. Lift half-grown Lettuces standing in exposed quarters, re-planting where protection can be given should unfavourable weather threaten.

Lift and protect a few Endive plants at this season, where a constant supply is valued all the winter.

Take care of all Cauliflowers or Broccoli now forming large heads. Prior to frost carefully lift with a fork and stand in a cool shed or cellar.

Remove all foliage from Asparagus as soon as this is quite brown. Clear the bed of weeds.

Gather all well-developed fruits on outdoor Tomatoes at once. Do not risk leaving them after the middle of the month.

Stand fruit of Tomatoes on sunny greenhouse shelves to ripen and make small green fruit into chutney.

Cover plants of Vegetable Marrows, which are still carrying numerous small fruits, with a garden frame, or a little hay or straw.

Use the hoe freely among all growing crops, especially late green Spinach or Turnips.

Give Brussels Sprouts plenty of liquid manure if they are late in forming "buttons." Avoid cutting the top leaves off.

Clear away all decaying leaves from Cabbages and similar crops, and use the hoe between the rows.

Protect the crowns of Globe Artichokes by heaping ashes over them about the end of the month.

Place a stick to all likely clumps of Rhubarb as a guide when selecting these next month for forcing.

Collect fresh fallen leaves from Oak, Elm, or Beech trees and store in a dry corner.

Start retarded crowns of Seakale in heat this month. Remove large leaves from beds in the garden and take off all likely crowns for removal to forcing pits or houses in December.

Keep the rows of Onions sown in August quite free from weeds, but do not attempt to force growth at this stage.

Look carefully over the store of large

Onions put under cover last month, removing all showing signs of decay.

Sow large growing varieties of Onions in shallow boxes and place in a cold frame all the winter. Give plenty of air when outside conditions are favourable.

Lift further batches of Carrots, Parsnips, and Salsafy, storing in sand.

Complete the lifting of late main-crop Potatoes immediately.

Make up Potato clamps.

Lift the first batch of Jerusalem Artichoke tubers after cutting down the growth.

Harvest and store all roots of Cardoons and Celeriac. Garden Swedes and Kohl Rabi can be left to stand the winter and be pulled as required.

NOVEMBER.

OUTDOOR FLOWER GARDEN AND PLEASURE GROUNDS.

Work hard at structural alterations on all suitable days until they are completed. Structural alterations which should now be done include—

(1) Making of New Borders.
(2) Laying of New Lawns.
(3) Making of New Shrubberies.
(4) Making of New Paths.
(5) Making of special gardens, as, for instance Rock Gardens, Japanese Gardens, Wild Gardens, Water Gardens, Herb Gardens, etc.
(6) Erecting New Garden Terraces.
(7) Erecting New Garden Steps.
(8) Erecting New Arches, Rose Poles, Pergolas for climbers, Arbours for trailing plants, etc.
(9) Erecting of New Garden Summer house.
(10) Removing of paths, existing steps, etc. etc.

Continue pushing forward floral alterations, such as—

(1) Re-arranging borders of plants according to their height.
(2) Re-arranging borders according to the colour of the flowers.
(3) Re-arranging borders so that each contains plants of one habit only, *i.e.* tall plants only, dwarf plants only, sweet-smelling plants only, or plants for cutting only.
(4) Making of direct colour borders.

Plant all kinds of herbaceous perennials.

Plant all kinds of hardy bulbs, completing this work by 7th November.

Plant all kinds of biennials for winter bedding, but complete this work as soon as possible.

Apply naphthalene to vacant flower garden land, to kill any lurking pests.

Apply lime to the new borders before planting.

Protect less hardy perennial plants in the borders by heaping ashes or fibre over their crowns.

Securely fasten growths of newly planted climbers to trellis or wall.

Lift early flowering Chrysanthemums and store the roots in a cold frame.

Protect Helleborus plants from cold and wet.

Keep beds of late blooming plants scrupulously tidy. Don't forget that neatly trimmed grass edges add much to the general appearance.

Plant all kinds of rock plants.

Plant all kinds of wall garden plants.

Plant all kinds of wild garden plants.

Plant all kinds of water garden plants.

Plant the following or any other trees and shrubs: Alder, Ash, Araucaria, Azalea, Beech, Birch, Blackthorn, Chestnut, Elm, Fir, Hawthorn, Holly, Laburnum, Larch, Laurel, Lime, Lilac, Oak, Pine, Plane, Poplar, Privet, Rhododendron, Sycamore, Walnut, Willow, and Yew.

Plant any or all of the following evergreen shrubs: Aucuba, Berberis, Buxus, Cerasus, Cotoneaster, Ilex, Laurus, Ligustrum, Ruscus, Spartium, Ulex, Viburnum, etc.

Plant any or all of the following deciduous shrubs: Buddleia, Chimonanthus, Cornus, Deutzia, Euonymus, Genista, Hibiscus, Kerria, Philadelphus, Ribes, Rubus, Spiraea, Syringa, etc.

Plant Roses.

Plant hardy climbers.

Dig over vacant land.

Spread a little rotted manure on the surface of existing perennial borders, forking it in immediately.

Apply basic slag if this has not already been done.

Complete all October work as early in November as is conveniently possible. Use all fine days for outdoor flower garden work, for indoor work can be done on wet days.

THE GREENHOUSE.

Bring in the first batch of Roman Hyacinths and Paper White Narcissus from the "plunge," at the beginning of the month.

Take cuttings of big bloom varieties of Chrysanthemums as they become available.

Reduce the supply of water to any Chrysanthemums whose blooms show signs of damping.

Pot up *Dielytra spectabilis* and Lily of the Valley, choosing strong crowns of the latter.

Pot on Herbaceous Calceolarias into 5-inch pots, using a rich flaky compost.

Consult the Chrysanthemum specialists' lists, or if convenient, visit one such establishment, with a view to the purchase of desirable novelties.

Renew the labels of permanent subjects where necessary.

Bring in the second batch of Paper White Narcissus and Roman Hyacinths; also a batch of the little-known Italian Hyacinths, at the end of the month.

Give careful attention to ventilation, admitting air early in the day on all favourable occasions.

Maintain a minimum night temperature of 45° F., where Perpetual Flowering Carnations are grown.

Poison or trap mice if they attack Carnations.

Wash all empty pots and seed-pans and stow away on the pot-rack.

Wash all crocks intended for drainage, and thereafter grade them into two sizes by passing them through a ¾-inch sieve.

Select curved crocks for placing over the drainage hole, and grade them into three sizes.

Cut and stack sufficient turf from an old pasture for next season's requirements.

Procure and place under cover a sufficient stock of cow or horse dung, and sharp clean sand.

Collect and stack leaves for forming leaf-mould for future use. Oak leaves have the highest value, and those of the Beech come in second.

HARDY FRUIT GARDEN.

Plant Gooseberry bushes on ground that has been deeply trenched and well manured a few weeks previously.

Push on the pruning of all kinds of fruit trees during fine weather.

Wheel out manure to fruit quarters on frosty mornings.

Dig between fruit trees and bushes after the pruning is finished.

Prune Morello Cherries. Cut out all old fruiting wood that can be spared, retaining sufficient of the ripened shoots to furnish the allotted space.

Plant Raspberries on well-prepared ground. Use plenty of manure and bonemeal when preparing for them.

Plant dessert Cherries on walls, and use plenty of lime rubble in the compost.

Finish root-pruning this month if possible.

Clear out old decayed trees from orchards, grubbing up all the roots.

Protect Fig trees in cold districts with dry bracken fern or mats.

Continue to prune and train all wall fruit trees.

Propagate all bush fruits by cuttings.

Top-dress fruit trees in narrow borders, using a rich compost for bearing trees.

Avoid using fresh manure when planting Apples, Damsons, Nectarines, Peaches, Pears, and Plums.

INDOOR FRUIT AND VEGETABLES.

Cleanse Fig houses, and wash trees with an insecticide after necessary cutting out of weak or overcrowded shoots has been completed. Top-dress the borders with loam and bonemeal after removing loose surface soil.

Spray pot fruit trees with a good caustic alkali wash.

Prune late Peach trees, and plant young ones.

Cut and store late Grapes.

Prune mid-season Vines after they have shed their leaves.

Water Endive and Lettuce very carefully. Remove decaying leaves and ventilate freely.

Maintain as near as possible a temperature of 50° F., in the Mushroom house.

Lift Seakale roots, and store them in a bed of ashes in the open.

Plant Rhubarb roots in Mushroom house or under greenhouse stage and keep dark.

Keep young seedling Tomatoes growing on a shelf near the roof glass in a temperature of 55–60° F.

VEGETABLE GARDEN.

Give the late rows of Celery the final earthing up, first making sure the soil at the roots is in a moist condition and that the leaves are quite dry.

Plant more Colewort, or London Greens, a foot apart for use during the early months of the next year.

Sow a few rows of Longpod Broad Beans, in a sheltered border where manure has been freely used.

Pick the rows of Spinach with care; whenever possible confine attention to a single row at a time.

Sow round-seeded varieties of Peas this month, more thickly than is usual, especially where the soil is heavy and insects numerous.

Suspend ripe Marrows intended for winter use from the roof of an airy shed.

Give late-planted Leeks plenty of liquid manure between the rows, delaying the final earthing up until next month.

Lift a few Parsnips and store in a cool shed as a reserve against bad weather if the district is an exposed one.

Keep a good supply of dry straw or bracken on hand for covering beds of Endive or Spinach should exceptional frost threaten.

Continue to collect dry leaves for making compost.

Dig, trench, or ridge all land as soon as this becomes vacant.

Continue lifting tuberous and tap-rooted crops.

DECEMBER.

OUTDOOR FLOWER GARDEN AND PLEASURE GROUNDS.

Plant shrubs and trees when weather is open.

Continue planting hardy herbaceous plants, rock plants, the wild garden, the water garden, etc., on fine days.

Renovate lawns, renewing the turf when necessary.

Roll walks, drives, lawns, gravel, tennis courts, etc., very frequently.

Sweep up the last of the leaves and make them into vegetable mould.

Tidy up all flower borders early in the month, cutting down the last plants which have bloomed.

Fork over all herbaceous borders, working in manure if not already done.

Renew labels where needed to rock plants and herbaceous perennials.

Continue planting Roses and hardy climbers.

Continue every kind of structural and general alteration of the garden except in frosty weather.

Tread the ground round newly planted herbaceous plants after frost to give them a firm root-run.

Put pea-sticks to support mats over annuals in very cold weather to keep them alive.

Insert more shrub cuttings.

Complete the winter bedding if owing to pressure of other work this could not be done last month.

Remove snow from choice specimen trees, bushes, climbers, etc., if there is so much that it may break their branches.

Renovate garden paths and drives.

Re-set edging stones to borders if inclined to sink.

Re-plant edging subjects if they have grown too thick.

Rake over shrubberies and remove leaves.

Fork over ground between shrubs working in some manure and peat.

Drain any portions of the garden which are too damp.

Prepare labels for spring planting.

Make plans for next year's work.

Go through your garden notes for this year to summarise your work.

Peruse seed catalogues as soon as they arrive.

Write your order for spring seeds and spring plants and send it in as soon as possible.

Re-make the reserve garden, since this will be vacant at the present time of the year. Dig and manure it thoroughly.

Fork over rose-beds if this has not been done.

Protect any plants which may be starting to bloom, from sudden bad weather.

Loosen the soil slightly round early bulbs which may be appearing.

Plant new hedges.

Grub out old shrubs which have become dilapidated during the year.

Make an effort to start the New Year well with work done up to date and as it should be.

Look over the rock garden, and see that the glass protecting Androsaces, etc., is still in its place.

Re-set any rock stones which may

have become loose owing to wet weather.

Ridge and trench all vacant land in the flower garden, manuring at the same time.

Pay some attention on dark December days to the Literature of the Garden. Read our article on this subject.

Make yourself a successful and proficient gardener by studying the cultural articles given in this Dictionary: they will help you.

Finally make a resolution to gain more success in the New Year than you have done in this one.

THE GREENHOUSE.

Propagate Chrysanthemums of the big bloom type, by cuttings.

Cut down big bloom Chrysanthemums, and remove them as soon as sufficient cuttings have been secured.

Cut down bush Chrysanthemums as they go out of bloom, but defer the propagation of these.

Introduce Chionodoxas, Daffodils, and Hyacinths, also Tulips of the Duc Van Thol type.

Pinch Schizanthuses when they have made 3 ins. of fresh growth.

Furnish Schizanthuses with temporary dwarf stakes.

Sponge the foliage of Agaves, Cordylines, Dracænas, and other smooth-leaved plants requiring cleaning.

Top-dress or, if necessary, re-pot *Cypripedium insigne*, finishing off with a layer of sphagnum.

Examine established Fuchsias stored away, and apply water if necessary. They should not be allowed to become dust dry.

Examine Begonia tubers lest they should suffer from damp, or from the attacks of mice.

Examine Lapagerias, and, if infested with brown or white scale, remove the pests with a pointed stick, and thereafter sponge with a solution of soft soap and tepid water.

Give Cinerarias weekly applications of liquid manure.

Continue to exercise great care in watering, as any excess at this season will have disastrous results.

Remove spent blooms, decayed leaves, and all decayed matter promptly.

Ventilate the house daily in moderation, if the external temperature does not fall below 40° F.

Maintain a buoyant atmosphere by warming up the pipes occasionally with the ventilators partially opened.

HARDY FRUIT GARDEN.

Postpone planting of fruit trees when the soil is wet or sticky.

Trench ground for spring fruit planting.

Keep the heads of standard Apple trees thoroughly open in the centre when pruning.

Plant Damsons on the outsides of orchard to break the wind.

Mulch all newly planted fruit trees with light manure.

Fork over strawberry beds, burying the seedling weeds.

Burn all perennial weeds with fruit tree prunings.

Plant Black Currants in a moist and partially shaded border.

Transplant one and two year old fruit bushes, giving them double the room.

Proceed with spraying after pruning orchard trees.

Prepare various composts for top-dressing fruit borders.

Prepare labels, stakes, and shreds in bad weather.

Use lime or lime rubble when planting all stone fruits.

Protect the stems of fruit trees in exposed situations from rabbits.

INDOOR FRUIT AND VEGETABLES.

Commence to force Figs in pots in a temperature of 50° F. Syringe the trees on sunny days. Water carefully until growth is active.

Cleanse late Peach houses.

Start early Peach trees in pots in a temperature of 45–50° F.

Start the early vinery towards the end of the month in a temperature of 50° F.

Prune late Vines.

Cleanse mid-season and late vineries.

Sow the first batch of Dwarf Bean seeds in boxes in a temperature of 55–60° F.

Blanch Endive by keeping the frame dark and protected from frost.

Pot up Seakale in a warm greenhouse for early forcing.

Introduce Rhubarb roots for forcing every three weeks throughout the winter and keep well watered after growth has started.

Water Tomato plants with care and give a little air on sunny days.

VEGETABLE GARDEN.

Continue to clear away all garden rubbish, burning all that is not decay-able. Store the dry ashes in wooden boxes for use when sowing seed in spring.

Dig up strong clumps or single crowns of Rhubarb early in the month, planting them close together in boxes and placing in a warm house.

Introduce the first batch of home-grown Seakale into heat, selecting the strongest crowns.

Commence forcing Chicory from now onward where absolute darkness can be secured.

Trench land intended for any deep-rooting crop next season, using plenty of rich manure in the bottom spit.

Give constant attention to salads, or Cauliflowers growing in cold frames. Remove all decaying leaves, and give ventilation when conditions are favourable.

Tread the soil between the rows of Cabbages planted early in the autumn to firm the soil round them after frost.

Protect Cauliflowers or Broccoli from frost, by placing a sheet of paper or spare leaf over the heads now forming.

Look over the store of all vegetables very frequently; avoid a stuffy atmosphere which induces early decay.

Start forcing three or four year old Asparagus in a warm house or upon a gentle hotbed.

Complete the lifting of root crops.

PRINTED BY MORRISON AND GIBB LTD., EDINBURGH

KS-640-141